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Cultivation of Science in the 19th Century Bengal

by

Rajesh Kochhar

Dr. Mahendra Lal Sircar

(1833–1904)

INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE

JADAVPUR, KOLKATA-700 032, INDIA

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Cultivation of Science in the 19th Century Bengal*

Rajesh Kochhar

National Institute of Pharmaceutical Education and Research, Sector 67, Mohali-160 062, Punjab, India

E-mail : rkochhar2000@gmail.co

Friends – *It is a matter of great pleasure and honour for me that I have been asked to deliver the Akshoy Datta Memorial Lecture. I am particularly elated that the lecture is named after Akshoy Datta (1820-1886). If Mahendra Lal Sircar was a man of science, Datta was a man of scientific methodology. In his time Sircar received donations from many rich men. But if we view the donation as a fraction of the total assets owned then Datta is probably the most generous benefactor of this institution.*

Abstract : India was the first country outside the Western World to take to modern science. The initiative came in the later half of the 19th century from *Calcutta*-based M.D. turned homeopath, Dr. Mahendra Lal Sircar, and resulted in the establishment of Indian Association for the Cultivation of Science in 1876. We place this initiative in the broader context of the transfer of Hindu community leadership from the landed class to the professional, and critically examine how the colonial government responded to it. We also discuss the achievements and the failures of the science movement in the 19th century. Given the class composition of the native leadership, science speculation was preferred to science application. While the Science Association succeeded in creating a general awarness about science and getting it incorporated into the university system, it failed to initiate basic research under its own auspices. It would be UK-trained government college professors who would place India on the world science map. We briefly touch upon how India's attitude towards modern science has been fashioned by the colonial experience.

Keywords : India, colonialism, English education, Cultivation of Science, Bengal middle class, 19th century

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Indian Association for the Cultivation of Science, Kolkata, today is a well respected modern scientific laboratory. To scholars, historians and laypersons alike the Science Association (founded 1876) is well known as the laboratory where Chandrasekhara Venkata Raman (1888-1970) did his experimental work that fetched him the 1930 Nobel physics prize. The dazzle of the prize has made it difficult to make an objective assessment of the early years of the Science Association which had been in existence for thirty tortuous years before Raman set foot in it in 1907. Many published accounts of the Association's history tend to give the impression that the sole purpose of its establishment was to wait for Raman to bring glory to it half a century later. An

*Akshoy Dutta Memorial Lecture–2008

individual award is an accident. No matter how happy it cannot be a factor in the historical assessment of an institution.

The Science Association succeeded in getting science introduced into the higher education system and motivating better-quality students for a career in science rather than in law or government service. It also provided high-ranking European government officials a glimpse of scientific activities back home. It however failed in its avowed goal to create cultural interest in scientific topics in public at large. Nor could it initiate scientific research under purely Indian auspices. It would be UK-trained professors employed in a government college (Presidency College, Calcutta), Jagadis Chunder Bose[1] (1858-1937) and Prafulla Chandra Ray (1861-1944), who would place India on the world science map twenty years later.

The Science Association came up during what were conflicting times for Bengal. The native leadership was still in the hands of the landed class (represented by the British Indian Association; see below) which was coming under increasing pressure to yield place to the new self-made middle class. Science Association represents the first ever Indian initiative for a middle class organization. Since it was in the name of science it could seek and obtain goodwill and support from the government as well as the landed class. Its formation was accompanied by that of a political organization with a similar name and involving more or less the same people : Indian Association (That would explain the rather odd name for a science institute). As is well known the Indian Association became the precursor of the Indian National Congress.

If science historians have examined the Science Association in romanticized isolation, students of political history have ignored it altogether. Here my aim is to try to place the Science Association in a wider context. What was the philosophy enunciated to justify it? How did the colonial government respond to it? What were the circumstances under which it was set up? What arguments were proffered to defend it? What did science mean to the late 19th century Bengal middle class? These are important questions that have a bearing on modern India's approach towards science. An attempt will be made to address these and related questions.

The Science Association was founded by Dr. Mahendra Lal Sircar[2] (2 November 1833 – 23 February 1904) who remained its general secretary till his death. The presidentship was held ex-officio by the Lieutenant-Governor[3] while the Viceroys agreed to become the patron[4]. Sircar owed his station in life to western education. A Calcutta University M.D. – turned homeopath, Sircar was the first Indian public figure to acquaint himself with the happenings in Europe on the scientific front; to introduce modern science into the collective Indian consciousness; and seek to invert the use of the race theory hitherto employed by the British to legitimize their rule. The view expressed in 1900 by Sir William Lee-Warner[5], former acting director of public instruction, Berar and Bombay, in what was obviously a prescribed school text can be taken to be prevalent throughout the 19th century : "From the West which owes so much in the past to the

Aryan race, India has in turn received freedom, free speech, free trade, free movement". Sircar wanted modern science to be added to the list.

Colonial science

It may be no more than a coincidence that the British merchant ships arrived in India the same year (1608) telescope was invented in the Netherlands. But it does bring home the fact that modern science and technology have grown hand in hand with maritime activity, colonial expansion and Western domination over nature and fellow human beings. The British could not have built and retained an empire in India without the help of science and the natives. This brought Indians in touch with modern science. The phenomenon can be conveniently discussed in terms of a three-stage model comprising the colonial-tool stage, the peripheral-native stage, and the Indian response stage, each leading to and coexisting with the next[6].

The colonial-tool stage began with field surveys and went on to include technologies such as steam, telegraph, railway and radio. The Western scientific interest in the subcontinent was latitude-driven in the sense that it was dictated by the geographical and ecological novelty of India (In contrast the current software-facilitated globalization – era Western interest in India is longitude-driven). The institutionalization of science as a colonial tool began in 1767 with the appointment of a surveyor-general in Bengal[7]. Ironically when we celebrate anniversaries of scientific institutions like the Trigonometrical Survey, Geological Survey or railways we are also unwittingly celebrating step-wise entrenchment of the British in India.

The peripheral-native stage can be taken to have begun in 1817 with the founding of the Hindoo College in Calcutta (see below). In this stage the Indians were assigned the peripheral role of providing cheap labour to the colonial science machinery. The peripheral native stage can be illustrated with the help of three biographies; Ardaseer Cursetjee (1808-1877); Radhanath Sickdhar (1813-1870) and Seebchunder Nandy (1822-1903). Sickdhar entered the Hindoo College, Calcutta in 1824 and joined the Great Trigonometrical Survey of India in 1831 at Mussoorie as a computer. He was one of the six boys so appointed but he is the only one who rose to make a mark. In 1843 he was transferred to Calcutta to take charge of the computational office there. He was elected a fellow of the Royal Astronomical Society in 1853.

Sickdhar was held in very high esteem for his mathematical abilities by George Everest as well as his successor Andrew Waugh. Everest recorded in 1835 that Sickdhar "received an exceedingly good elementary education in mathematics...which he had the good sense considerably to extend". He was given a personal monthly allowance of Rs 100 to dissuade him from leaving the Survey. On his part Sickdhar noted with pride that Everest admitted him "in his own table"[8]. The following letter written by Lieutenant Colonel Walter Stanhope Sherwill of Scotland and published in *The Friend of India* in 1876 makes interesting reading. "A friend has just sent me a

copy of the *Friend of India* of the 24th June, all the way from Germany, in order that I might be made acquainted with the *sad fact* that, when bringing out a third edition of "Smyth and Thuillier's Manual of Surveying for India," the much respected name of the late Babu Radhanath Sikdar, the able and distinguished head of the computing department of the Great Trigonometrical Survey of India, who did so much to enrich the early editions of the "Manual," had been advertently, or inadvertently, removed from the preface of the last edition; while at the same time all the valuable matter written by the Babu had been retained, and that without any acknowledgment as to the authorship.

As an old Revenue Surveyor who used the "Manual" for a quarter of a century, and as an acquaintance of the late Radhanath Sikdar, I feel quite ashamed for those who have seen fit to exclude his name from the present edition, especially as the former Editors so fully acknowledged the deep obligations under which they found themselves for Radhanath's assistance, not only for the particular portion of the work "*which they desire thus publicly to acknowledge* – so runs the preface of the 1851 edition, – *but for the advice so generally afforded on all subjects connected with his own department.*

"Yesterday only I mentioned the circumstance of the omission of Radhanath's name to one of the Tagores, an old and intimate friend of Radhanath's and who is now travelling in Scotland; he was pained beyond measure, but made the significant remark "you see, he is a dead man"[9].

Sickdhar's "hobby was beef, as he maintained that beef-eaters were never bullied, and that the right way to improve the Bengalees was to think first of the physique or perhaps physique and moral simultaneously"[10]. He certainly had moral courage. Whether it was due to beef or not is difficult to say. In 1843 he stubbornly confronted an English magistrate on the latter's maltreatment of "paharee coolies". Although the colonial administration fined him Rs. 200 for his "criminal" action he was hailed as a hero by his countrymen[11].

Nandy joined the Calcutta Mint in 1846. When in 1852 the Company decided to construct telegraph lines in India under the superintendence of Dr. William O'Shaughnessy (1809-1889), Nandy became his assistant. By the end of 1856 India had 4,250 miles of electric telegraph and 46 receiving offices. "During the Mutiny of 1857 he [Nandy] rendered excellent service, sometime acting as head of the Telegraph Department's headquarters; and in order to secure the communication between Calcutta and Bombay, he laid down a portion of the alternate line from Mirzapur to Seoni via Jubblepore"[12]. As Sir John Lawrence (1811-1879), Chief Commissioner of Punjab and later India's Viceroy during 1864-1869, put it matter-of-factly : "Telegraph saved India", for the British that is. Nandy was made a Rai Bahadur in 1902 and Calcutta named a lane after him conveniently calling it "the Sibu Nandy Lane"[13] no doubt to avoid using his anglicized spellings.

Bombay-based Cursetjee, a scion of the Wadia shipbuilding family, had a natural flair for engineering. He even assisted Arthur Bedford Orlebar, professor of natural philosophy at the Elphinstone College, "in instructing the natives, especially in mechanical and chemical science"[14]. Introduction of steam in 1829 necessitated the upgradation of native skills. "The prompt repair of the engines of the numerous steamers arriving in Bombay posed a problem. Few of the European engineers and drivers could withstand the climate, and those who were enabled to do so proved so troublesome that a remedy for the inconvenience appeared of paramount importance"[15]. The remedy was Ardaseer Cursetjee, then an assistant builder at the dock, who was officially sponsored to visit England. Duly trained and networked, he was appointed Chief Engineer and Inspector of Machinery at the Company's factory and foundry in Bombay in 1840. It was noted in the press that a "body of English workmen" would be under his charge. In 1841 he became the first Indian to be elected a Fellow of the Royal Society of London. Of course the Society was then more a gentleman's club than the learned body it became later. The distinction however does not seem to have made any impact in India. Bombay was perhaps too practical to make sense of an honour bestowed in London while it was too early for Calcutta to be interested[16]. The Wadias' familiarity with steam had far reaching consequences. It led to the mechanization of Indian textile industry. Ardaseer's grandson Nowrosjee Nusserwanjee (1849-1899) who as a young boy had been dispatched "to school in Liverpool and for factory training" set up the Bombay Dyeing and Manufacturing Company in 1879, and then the Century Mills which subsequently changed hands[17].

In course of time the Indians, educated and trained under colonial auspices, developed a world perspective on the benefits the West was deriving from science and decided to join the world club of science as equals. Science Association marks the beginning of the Indian response stage. Here we generally use the term native to refer to Indians in a subservient role. The term Indian is employed when there is exercise of, or desire to exercise, free will.

Two early examples of native contribution to basic science deserve mention. In 1850 Master Ramachandra (1821-1880) of Delhi College published a mathematical text *A Treatise on Problems of Maxima and Minima* solved by Algebra. The famous British mathematician Augustus De Morgan was much impressed by it. He saw in it "not merely merit worthy of encouragement, but merit of a peculiar kind, the encouragement of which was likely to promote native effort towards the restoration of the native mind in India"[18]. The book was reprinted in London in 1859 with a foreword by De Morgan. Additionally, the Company "were pleased to sanction a *khillut* (dress of honour) of five pieces to be presented to him and also a reward of Rs. 2000" [19]. "Encouraged by such appreciation" Ramachandra published in 1861 his second work *A New Method of the Differential Calculus*. Much to the horror of the native communities, Ramachandra converted to Christianity in 1852. He would have been killed in 1857 if he had not been

saved by his friends and former students. "Since he was by far the most advanced in English studies, it was inevitable that his name should be held up for a warning, as to what results might happen if the English language were allowed to be taught to the young"[20]. His impact on modern science in India remained non-existent[21].

In distant Madras Chintamani Ragoonatha Charry (d.1880) joined Madras Observatory as a young boy and rose to discover a variable stars R Reticuli. This was the first recorded astronomical discovery by an Indian. He was elected a fellow of the Royal Astronomical Society in 1872[22]. In their time both Ramachandra and Ragoonatha Charry were presented as proof of colonial success in improving the natives.

A myth was created in the 1930s, when Sickdhar had been dead for more than six decades, that the height of Mount Everest was calculated by him[23]. The implication is that he was cheated of due credit by the colonialists. This is patently wrong. "Official records clearly show" that the "computations which determined the position and height of the highest mountain of the world" were carried out at Dehra Dun, when Sickdhar was already in Calcutta[24]. Why was the myth created and why has it persisted? There can be no doubt that Sickdhar was the father of mathematical techniques in surveying in India. His contribution was sought to be dramatized by associating his name with the very pinnacle of century-long surveying operations. By the 1930s the discontent against the British had become quite pronounced. Rewriting the 19th century was part of attempts to fuel the 20th century anger. As we shall see later a similar myth was created about Jagadis Bose's being denied the Nobel prize. Persistence of such myths even today, evidence to the contrary notwithstanding, arises out of our current disappointment at missed opportunities in science.

English education

The British Parliament first took notice of the Indian possessions in 1773 with the grant of a Charter to the Company. The Charter would come up for review and renewal every twenty years preceded by intense lobbying. The last Charter was issued in 1853. Thus all major initiatives on India occurred in the years 1773+20*n* where *n* ranged from zero to four. India was taken over by the Crown in 1858 bringing to an end the most bizarre experiment in governance the world had ever seen (The Company was finally disbanded in 1873).

India was a nice country to own but its people could not be wished away. India was already a thickly populated country. Large-scale European settlements were not possible especially because an industrializing England required its manpower for itself. Also after the disastrous Portuguese experiment and the bloody Haitian revolution in 1790 mixed marriages were ruled out. There was thus no alternative to training the natives to take up lower-level administrative jobs. In addition there was this desire to civilize them. In 1793 when a bill for English education for the natives (and for missionary activity) was introduced in the British Parliament the Court of Directors

opposed it and got if defeated. Among the influential persons consulted by the Company was the barrister, Randle Jackson, who brazenly blamed the secession of the American colonies to the English folly in opening schools and colleges there and warned the Directors "to avoid and steer clear of the rock we had split on in America"[25]. Twenty years later the Parliament did pass a resolution saying that "such measures ought to be adopted, as may tend to the introduction among them [natives of India] of useful knowledge, and of religious and moral improvement"[26]. The Parliament further directed an annual expenditure of "not less than one lakh of rupees" on the education of the natives. The Charter also ended the Company's monopoly of trade with India which was now open to all. This enabled Europeans and Indians to collaborate in making money together through trade.

The Company was in no hurry to comply with the educational clause. It was only in 1817 when the Mahratta power was broken and the British grip on India became unassailable that the Governor-General, Lord Hastings, could loftily declare "that the Government of India did not consider it necessary to keep the Natives in a state of ignorance, in order to retain its own power"[27]. The same year the native leadership in Calcutta, encouraged and supported by the British officials and non-officials, collected a handsome amount of more than a hundred thousand rupees to found a private institution called the Hindoo College (the school section) for "the tuition of sons of respectable Hindoos", respectability being measured in term of the ability of the parents to pay a monthly fee of the then princely sum of five rupees[28]. How high the fee was can be gauged from the following incident. About the same time Iswarchandra Vidyasagar's (1820-1891) would-be father Thakurdas came to Calcutta at the age of fifteen in search of employment. "After a good deal of hardship he secured a job which carried a monthly pay of Rs. 2. His meritorious service soon earned him a rise in pay to Rs. 5 per month. But in those days a rupee would go very far. Thus ended the days of misery of the family", which comprised his mother, four sisters and a brother[29]. In 1817 itself the School Book Society was established "for the preparation, publication and cheap or gratuitous supply of works in schools and seminaries of learning in English and oriental languages, but not to furnish religious books"[30].

The benefit of English education was soon extended to poor Hindu boys through the efforts of David Hare (1775-1842) and others[31] by the establishment of Calcutta School Society in 1818. Government grants were forthcoming for the education of native elites only from 1823 with the establishment of a General Committee of Public Instruction in Calcutta and corresponding committees elsewhere. British India was the first country in modern times to provide state funding for education. The peculiarity of the Indian case can be gauged from the fact that while the aid in the Western countries was meant to benefit the poor, in India it went to the upper classes. Hindoo College started receiving government[32] aid in 1823 under official supervision and was taken over by the government in 1855 as Presidency College. It is significant that for

three decades the government was aiding an educational institution meant strictly for a particular community. Unlike the Hindus, especially in Bengal, the Muslims were not keen on English education. In 1826 the Company "sanctioned the opening of an institution in Murshidabad for the education of the members of the Nizamat family", but they refused to "embrace the opportunity"[33]. Maulvi Nazir Ahmad's (1833-1912) father sent him from Bijnor to Delhi to study traditional Islamic sciences. The father permitted Nazir to accept a stipend from Delhi College on the condition that he not learn English. Nazir Ahmad learnt English later and rose to become a deputy collector[34].

Sir Mountstuart Elphinstone (1779-1859), who annexed the Peshva territory and was the Governor of the Bombay Presidency during 1819-1827, had "a pile of printed Mahratta books" in his tent. When asked about them, he said that they were "To educate the natives", adding that, "but it is our high road back to Europe". When asked why he then insisted on the native education, Elphinstone's reply was that "We are bound, under all circumstances, to do our duty to them"[35]. In 1838 Sir Charles Edwards Trevelyan (1807-1886), a Company civil servant and brother-in-law of Lord Thomas Babington Macaulay (1800-1859), noticed "by actual observation and experience" two sets of ideas prevailing among the natives. In parts of India "where, owing to the comparative novelty of our rule and in the absence of any attempt to alter the current of native feeling", people wanted "the sudden and absolute expulsion of the British". Trevelyan was thus anticipating the 1857. The educated natives in Bengal, he noted, stood in sharp contrast. "Instead of thinking of cutting the throats of the English, they were aspiring to sit with them on the grand jury, or on the bench of the Magistrates", "all of them being fully sensible that these plans of improvement could only be worked out with the aid and protection of the British Government by the gradual improvement of their countrymen in knowledge and morality", requiring "a long continuation of our administration, and the gradual withdrawal of it as people became fit to govern themselves"[36].

Inherent in the British rule over India was the slow and increasingly reluctant training of the Indians to eventually overthrow that role. The strategy can be said to have been eminently successful. The British rule lasted close to two centuries and when the colonialists left they did so with tremendous goodwill. Bengal occupied a special place in this scheme of things. The British transformation from a *vaishya* (trading) outfit into a *kshatriya* (ruling) organization began in Bengal which became British India's biggest and the richest province. Calcutta, the capital of British India since 1774, understandably received special treatment. Of the total amount spent on education in the 18 year period 1813-1830 as much as 76% was disbursed in the Bengal Presidency, 19% in Bombay and only 5% in Madras[37]. The pre-eminence of Bengal, more specifically Calcutta, as recipient of government educational grant would continue throughout[38] and play an important role in initiating basic scientific research here by the Indians.

New Bengal social class

Madras (founded 1639) and Bombay (acquired 1668) both lay off the political map of the time; that is why the Company could own them. But Calcutta (founded 1690) came with its vast hinterland. Here the Company entered the Indian mainstream. Beginning with the 1698 purchase of the petty zamindari of the three Calcuttan villages, Sutanati, Govindpur and Dihi-Kolkata, from the Mughal administration[39], the Company worked its way upwards and ended up owning the country itself. Since the Company was replacing Muslim rulers, the Hindus were favourably inclined towards it (In western India the British would face the odium of deposing Brahmin rulers). Also in Bengal the British had the convenience of dealing with a social class they themselves had created and which owed its wealth, social status and native leadership position to its association with the British[40] (In contrast, elsewhere in the country the British would have to come to terms with the pre-existing social elites which had their own notions of prestige and self-importance).

Not only did the British create a new social class they also invented a new India for it to dwell in and dwell on. This was the Indologist's India as distinct from the artisan's India. While Europe through the telescope, microscope, maritime voyages and geographical explorations was discovering for itself that knowledge did not lie in churches, archives and the past but in the open and in the future, India was seduced into defending an ancient culture which in its time had belonged to a small segment of appropriators of wealth but was now presented as if it were representative of the whole country. It is noteworthy that in the early years the European officials did take interest in traditional Indian technology (wootz steel, dyes, variolation, *etc.*[41], but the phase soon passed. No Indian in the 19th or early century seems to have paid any heed to this aspect of India. The Hindus were introduced to what we may call *archivalism.*

The physical foundations of the British empire in India may have been laid at Plassey but the legitimacy for it came from the Asiatick Society type of researches (Old spellings have been advisedly used). Fortunately for the British at the very beginning of their rule over India there came the discovery of Indo-European linguistic commonality then interpreted in purely racial terms. It was famously enunciated in 1786 by the founder president of the Asiatick Society, Sir William Jones (1746-1794). Jones declared that Sanskrit, Greek and Latin "sprung from some common source, which, perhaps, no longer exists". He went on to assert that "there is a similar reason, though not quite so forcible, for supposing that both the Gothic and the Celtic, though blended with a very different idiom, had the same origin with the Sanscrit"[42].

Orientalism[43] which would be confrontational in the Muslim world was seductive, persuasive and interactive in India where it took the form of Indo-Europeanism[44]. Indo-Europeanism "placed in the hands of the British Government a powerful instrument of connexion and conciliation" with the (upper-caste) Hindus. The thesis went like this.

Both the Europeans and the upper-caste Hindus belonged to the Aryan race, while the Muslims were the other. The British rule set up by defeating the Muslims was therefore a restoration. The Hindus had their period of glory in the ancient past when the Europeans were still barbarians; now it was the turn of their European brethren to rule (see below).

The British interest in ancient India liberated Sanskrit from the custody of the priestly class and transformed the scriptures into books of civilization. The European discovery of the glory of ancient India raised self esteem of the new Indian middle class. The introduction of Western law and modern medicine for reasons of administration and good governance made a significant impact on the natives. These inherently egalitarian disciplines planted the concepts of human equality and dignity in native minds. Indeed lawyers and medicos would play a leading role in the nationalist movements. The Aryan race theory gave legitimacy not only to European domination over India but also to upper-caste domination within India. Just as the English-knowing class raised itself in the social scale within India with the British help[45], it next wanted British help in raising India in the scale of nations under its own leadership[46]. The lead came in the 1870s from Dr. Mahendra Lal Sircar.

Mahendra Lal Sircar : Life sketch

Our major source of biographical information on Sircar is Sarat Chandra Ghose, a fellow homeopath, who first published an obituary of Sircar in 1904 in the ninth volume of *The Hindustan Review and Kayastha Samachar.* This was expanded into a book in 1909 the second edition of which appeared in 1935[47]. This is a valuable source which unfortunately has not been fully tapped by self-conscious historians because of its homeopathic orientation. Assuringly, its contents are entirely consistent with Sircar's obituary published in the journal he himself had founded, *Calcutta Journal of Medicine.* Although the author's name is not given it is presumably his son Dr. Amrita Lal Sircar (1860-1919)[48]. A brief scientific biography of Sircar was published by G A Natesan in 1929[49]. Except for a few minor discrepancies, it agrees with and is complementary to Amrita Lal's and Ghose's works on which it is no doubt based. Another valuable primary source is the collection of personal diaries covering the period 1873-1899 with some interruptions by Mahendra Lal Sircar and Amrita Lal Sircar. They have been recently brought to light by Arun Kumar Biswas who has selectively quoted from them[50].

Sircar was born on 2 November 1833 in a poor family in a small village Paikpara some 30 km west of Howrah. He described himself "as a man of the people sprung from the actual tillers of the soil"[51]. When he was five years old his mother brought him and his younger six-month old brother to her own brothers' house in Nebutola in Calcutta. A few days after his arrival in Calcutta the death of his father occurred at Paikpara. The family went back for the last rites but soon returned to Calcutta for

good. If Sircar's mother had to shift with her sons to her brothers' place even when her husband was alive the family must have been extremely poor[52]. The mother also died four years later, due to cholera, leaving the orphaned boy in the care of his maternal uncles who themselves were not well off. A brilliant student, young Sircar received support from a number of people whom he always remembered with a sense of gratitude. He was sent to a traditional *pathshala* for learning Bengali and to a tutor for English. At the age of seven he was admitted to David Hare's School where he received free education[53].

Sircar finished school in 1849 with a junior scholarship to go to the Hindoo College where he won a senior scholarship. Sircar did not think much of the Hindoo College where "the principal object of education was to teach the pupils how to read and write the English language". His "fierce passion for science" made him shift to the Medical College, "the only place in those days where the students were given practical lessons in some of the more important sciences"[54]. "Dr. Mahendra Lal Sircar originally had no intention to study medicine...his favourite subject was Psychology. There are a great many problems involved in the study of Psychology, which cannot be well understood without a knowledge of Biology. He did not get satisfactory explanation of many such points from his professors. He therefore decided to join the Medical College to study for himself the science of Biology..."[55].

Sircar joined the Medical College in early 1854 and passed the Licentiate in Medicine and Surgery examination in 1860. In the meantime Calcutta University was set up in 1857. In 1862 Sircar successfully wrote to the University saying that his senior scholarship certificate be recognized as B A diploma to enable him to sit for the MD examination[56]. He got his MD in 1863 in first class. As a private practitioner Sircar was able to translate his academic brilliance into professional, financial and social success. When in 1863 the Bengal chapter of the British Medical Association was opened through the efforts of Dr. Goodeve Chuckerbutty, Sircar became an active member[57]. After serving as its secretary for three years he became a vice-president in 1867. However much to the shock of his colleagues and former teachers he took to homeopathy under the influence of Rajendra Lal Dutt[58] (1818-1889) then a millionaire merchant and himself an accomplished practitioner. Sircar boldly announced his conversion in February 1867 from the august platform of the Medical Association itself for which sin he was unceremoniously thrown out[59].

A dejected but determined Sircar declared to himself : "I am a farmer's son and will better live by humble work, but what I have known as truth must be told and worked upon"[60]. After an initial setback Sircar was soon able to establish a very successful and high-priced practice. In September 1874 he increased his fee for a single prescription in Calcutta from Rs. 10 to Rs 16. Subsequently it was further raised to a whopping Rs. 32[61]. In 1875 he was charging as much as Rs. 500 per day for an outstation visit[62]. He was consulted by many eminent, rich and influential personages

of his time including the greatly revered mystic Ramakrishna Paramhans[63]. Sircar's medical contacts would stand him in good stead in his later fund-raising drive.

He was made a Companion of the Indian Empire in 1883 by the popular liberal Viceroy Lord Ripon. This was the beginning of Sircar's social rise. Sircar was appointed sheriff of Calcutta in 1887. He served as an honorary presidency magistrate for 25 years 1887-1902 when ill health forced him to resign. He was a nominated member of the Bengal Legislative Council from 1887 to 1893. He remained an elected commissioner of the Calcutta Corporation for several years and made his mark on the Municipal Board especially in the department of sanitation. For many years he was a trustee of the Indian Museum as a representative of the Asiatic Society[64]. In 1899 he was invited to give evidence before the Indian Plague Commission[65].

He had a long association with the Calcutta University. He was appointed a Fellow of the University in the Faculty of Arts for life with effect from 1871[57]. For ten successive years he was a member of the Syndicate and frequently acted as its president in the absence of the Vice-Chancellor. He was also for four successive years, 1893-1897, president of the Faculty of Arts (Buckland II: 1065). The University in 1898 bestowed on him the honorary degree of doctor not in science, but law, for "his labours in the cause of science" and for his service to the University.

Notwithstanding the honours bestowed on him, non-acceptance of his homeopathic credentials by the mainstream rankled him. As an influential member of the Calcutta University Senate he persuaded it to transfer him from the Arts to the Medical Faculty. Persistently hostile reaction from the latter forced him to revert back. It would be instructive to discuss the episode at some length because the published historical research seems to find the whole thing rather embarrassing and has tended to shove it under the carpet. The episode has been discussed in Sircar's homeopathic biography[68] with a sense of injury. Understandably, the emphasis here is on Sircar's representations in defence of homeopathy than in the University proceedings. A fuller version is attempted below.

Rebuff from the Medical Faculty

When the Calcutta University Senate held its first meeting of the fiscal year 1878-79 on 27 April 1878, it had a routine item on the agenda, namely, the adoption of the annual report of the Syndicate for the past year. Babu Kali Charan Banerjee and Rev. K M Banerjee proposed an innocuous-looking amendment that "Dr. Mahendra Lal Sircar's name should be added to the list of members of the Faculty of Medicine given in the report". The report, "subject to this amendment" was duly passed by the Senate. Interestingly, Sircar was present at the meeting[69].

The matter then went to the ten-member Faculty of Medicine which included an Indian, Munshi Tamiz Khan, Khan Bahadur. It met on 15 May 1878 to unanimously pass a resolution bluntly declaring that "they are unable to associate themselves as

a Faculty of Medicine with a member who professes and practices Homeopathy; an inability of which probably the Senate were not aware when the nomination was made; hey trust. Therefore, that the Syndicate may be able to remove the present difficulty by the transfer of Dr. Mahendra Lal Sircar's name to another Faculty or in some other manner". Sircar protested by addressing a long letter to the Registrar, defensively adding that "As men of Science they [Medical Faculty] should have been more accurate in their language, especially when they sat to condemn a professional brother"[70]. Sircar's use of the phrase professional brother is interesting. The point precisely was that the Medical Faculty did not wish to include him in their brotherhood.

Sircar's letter was discussed by the Senate on 13 July 1878 at a meeting specially called for the purpose. It passed a resolution requesting "the Faculty of Medicine to re-consider the resolution come to at their last meeting with special reference to Dr. Mahendra Lal Sircar's letter now read"[71]. The Medical Faculty met on 23 July 1878 to discuss the matter. It now had two Indian members Tamiz Khan as before and Rai Kanailal De, Bahadur [also spelt Dey]. They unanimously reiterated their earlier decision, pointing out that having a homeopath on the Faculty will "deteriorate the value of the University Medical degrees" and cause "serious loss" to "all present and future Medical Graduates", and will be "to the manifest discredit of the University in public estimation".

This brought forth another long reply from Sircar which was placed before the Senate on 31 August 1878. There was a strong worded proposal from the medical members asking the Senate to rescind its earlier order transferring Sircar to the Medical Faculty. A counter-proposal came from Dr. Rajendralala Mitra[72] and Dr. K M Banerjee saying that Sircar's letter and the Faculty's proceedings be put on record. This was put to vote and passed[73]. In other words the Senate's earlier decision to transfer Sircar to the medical Faculty stood. Sircar's victory however was pyrrhic[74].

On 2 September 1878 "Dr. Partridge and seven other members" (presumably all European) resigned from the Faculty. They were individually informed "that they [the Syndicate] have no power to accept the resignation by any member of the Senate of the Faculty to which he belongs". The resigning members surely knew the legal position. There aim was to exert pressure. The message indeed went home. On 7 September 1878 just before the Syndicate met, Dr. Sircar handed a letter on the basis of which he was transferred from the Faculty of Medicine to that of Engineering[75]. Perhaps this transfer was a face-saving device, because Sircar does not seem to have attended any meetings. Eventually he went back to the Faculty of Arts[76], because we find him as its president 1893-1897. A quick perusal of the University proceedings has failed to reveal any clues as to when exactly he returned to Arts. It would be useful to ascertain the precise date. It is noteworthy that although he did not belong to the Medical Faculty he did serve as an examiner for Medical College examinations, as can be seen from the Syndicate proceedings. On 26 March 1896 he wrote to the University

declining to serve as the president or as a member of the Syndicate for reasons of health (Interestingly in spite of Sircar's own commitment to and public defence of homeopathy it was not taught at the Science Association although Hahnemann's anniversary was celebrated).

Science Association : Manifesto

Within a year of his conversion to homeopathy, Sircar founded in January 1868 a journal called the *Calcutta Journal of Medicine* with the object of popularizing his new creed. It was billed as "a monthly record of medical and auxiliary sciences". In the issue brought out on 8 December 1869 (though nominally dated August 1869) Sircar published an essay entitled "On the desirability of a national institution for the cultivation of the Sciences by the natives of India". The essay was published separately as a pamphlet. This is an historically important document. It sought to use Indo-Europeanism to Indians' own advantage[77].

Sircar begins by citing an article "On the teaching of natural science in schools" published in the July 1869 issue of the (British) *Quarterly Journal of Science*. He then makes an unnecessary digression charging the whole of Europe with being uncivilized by definition because "Until men should learn to respect each other's honest convictions, and until they should be free from all prejudice, in other words, be fearless of the consequences of the discoveries in the fields of knowledge, they cannot be said to have become civilized men". This diatribe seems to be directed against critics of homeopathy.

Sircar then comes to his main thesis where he makes the first Indian use of the race theory. Where did he get his inputs from? The British journal which he quoted from was barely six years old. Sircar would presumably have read the 23-page-long editorial in the inaugural issue (1864) describing the benefits Britain had derived from science and technology in various fields. The editorial declares that "All questions...concerning the connection or differences between the various races of mankind, will receive the earnest considerations of the writers in this Journal", because these questions are "par excellence questions of the day". The editorial disapprovingly refers to the view expressed by the president and the secretary of geographical and ethnological section at the 1863 meeting of the British Association for the Advancement of Science, "that the Negro is inferior, intellectually, to the European" and further that "whenever intellectual superiority exists in a man of colour, he is always found to have an admixture of white blood in his veins" (The editorial made it a point to protect its own liberal credentials by pointing out "that the gentlemen who thus sought to denigrate the Negro race, were the tools of the Southern Confederacy and had been enlisted as the champions of slavery in England").

Sircar became a life member of the British Association for the Advancement of Science in 1864. If he had at hand its earlier proceedings he would have been familiar

with Max Muller's paper, entitled "On the relation of the Bengali to the Arian and aboriginal languages of India", which was read at the 1847 meeting. Max Muller argued that Indians are "one great branch of the Caucasian race, differing from other branches of the same race merely by its darker complexion". He stated that "it is curious to see how the [English] descendents of the same [Arian] race, to which the first conquerors and masters of India belonged, return...to accomplish the glorious work of civilization, which had been left unfinished by their Aryan brethren"[78].

The phrase Aryan brethren, Max Muller's own coinage, profoundly influenced the thinking of Indian leadership throughout the nineteenth century. The charismatic Brahmo Samaj leader, Keshub Chunder Sen (1838-1884) declared at a public meeting in Calcutta in 1877 : "Gentlemen, in the advent of British nation in India we see a reunion of parted cousins, the descendents of two different families of the ancient Aryan race"[79]. In far-off South Africa, Mohandas Gandhi addressed an open letter (1894) to the members of the legislature protesting against the ill-treatment of the Indians, and circulated it among the Europeans in Natal. In it Gandhi pointed out "that both the English and the Indians sprang from a common stock, called the Indo-aryan"[80]. [Indo-aryan is wrong. It should have been Aryan]. In fact Mohandas Gandhi becomes Mahatma Gandhi only when he jettisons this historiography.

So far Indo-Europeanism had provided the British with the legitimacy for their rule; now it would provide the natives with the courage to mildly challenge that rule.

Sircar argued that "the once glorious Hindu nation" has been "down-trodden for centuries by foreign yoke and a most de-energizing religion". "The Hindu mind, thanks to this religion that has been swaying it for centuries without number, and thanks no less to its other surroundings, has lost much or its original Aryan vigor and energy". Fortunately help was at hand in the all-important task of regeneration. The British increasingly recognized that they had "a duty to perform towards us", that is their "brethren, now fallen and degraded". "It must be acknowledged with gratitude that England, despite all shortcomings inseparable from a foreign rule, is doing her duty right royally. She has become aware that her true glory should consist not in simply holding under subjection the people of India, but in elevating them in the scale of nations, in taking them by hand and reconciling them to their long alienated brethren, her own children [that is, the English people themselves]". "Let us thank Heaven then, that though nominally under a foreign power...we have fuller opportunities of developing the ends of our being, of fulfilling our destiny."

Sircar was clear[81] that "The best method...the only method...by which the Hindu mind can be developed to its full proportions is...by the cultivation of the Physical Sciences. The great defects, inherent and acquired,...of the Hindu mind...of the present day can only be remedied by the training which results from the investigation of natural phenomena". The envisaged institution "shall be for the instruction of the masses, where lectures on scientific subjects will be systematically delivered, and not only

illustrative experiments performed by the lecturers, but the audience should be invited and taught to perform them themselves". "And we wish that this Institution be entirely under native management and control" so that "we may begin to learn the value of self-reliance without any serious risk".

Where would money come from for the proposed science institution? Sircar hoped that the Rajahs and noblemen "will be willing...to spend a fraction of their wealth for such a glorious purpose as the amelioration, nay regeneration, of their own country, when their ancestors could spend so liberally on such ignoble and ridiculous occasions as the marriages and burials of dogs and cats". Sircar also hoped that aid would be forthcoming "especially from the English community", to which "it will be gratifying to see that we have at last learnt to beg for such noble purposes, which we must gratefully set to the credit of their own example". Finally to reassure the administration and fellow loyalists, he hoped that the foundation stone of "the Temple of Positive Science" [quotes in the original] would be laid by the Prince of Wales during his forthcoming visit.

Later in 1872 no doubt bowing to the public opinion he tried to tone down his criticism of the traditional society and declared : "It is hardly necessary for me to formally declare that I have never meant the cultivation of the physical sciences to be a panacea for all ills incident in human nature, and certainly I never meant that the Association in question was the only remedy I could propose for the evils that teem to my unfortunate country"[82] (Biswas 2003: 79-80). In subsequent campaign writings he tended to use the term Indian rather than Hindu. However in 1891 he recalled : "It is to help in reluming the light of knowledge in the breasts of my countrymen in order to restore their old Aryan vigour of intellect, that this Association has been established". A quarter of a century later Sircar's 1869 views were echoed by P C Ray while concluding his monumental *History of Hindu Chemistry* : "The Hindu Nation with its glorious past and vast latent potentialities may yet look forward to a still more glorious future, and if the perusal of these lines will have the effect of stimulating my countrymen, to strive for regaining their old position in the *intellectual hierarchy* [italicized in the original] of nations, I shall not have laboured in vain"[83].

Far more significant is the response of Sircar's contemporary, the well-known Bengali author, Bankim Chandra Chatterjee (1838-1894), who wrote an article in 1872 in his popular magazine *Bangadarshan* advocating the cause of the Science Association[84]. He also gave a donation of Rs. 500 on 14 January 1876[85]. More importantly, Bankim seems to have drawn on the Sircar thesis while bringing his influential novel *Anandamath* to a close. As we shall see in the next section a December 1875 report prepared by the provisional committee called "the restoration and elevation of the people of India" as "the mission of England" (Biswas 2003: 125), More specifically Sircar in the sketch of the scheme for the proposed Science Association declared in the closing paragraph that he had "a right to expect aid from all countries and peoples, especially from those

which are enjoying the advantages and privileges of the cultivation of science"[86]. Going overboard in December 1875 Sircar wrote on the eve of the visit of Prince of Wales to India : "I hope that the Prince in whose veins runs the best blood of the most intellectual nations of Europe, will lend a helping hand in laying the foundation of an institution which will be a pledge as it were of England's good wishes to India, and serve as a lasting monument to remind India's children of the debt immense of India's gratitude they owe for their intellectual moral revivification to England's noble sons[87]. In *Anandamath* after the sanyasis have crushed the Muslim rebellion and wish to take on the English, a Healer *(Cikitsak)* appears on the scene. This Healer could have been Dr. Mahendra Lal Sircar himself even though transported a century back. The Healer explains that the knowledge is of two kinds : Outward and inward. "For a long time now the outward knowledge has been lost in this land, and so the true Eternal Code has also been lost". It is noteworthy that in the first edition of *Anandamath* Bankim used *Arya dharma* in place of Eternal Code *(sanatana dharma)*. The Healer continues : "The outward knowledge no longer exists in this land...The English are very knowledgeable in the outward knowledge, and they are very good at instructing people. Therefore we'll make them king. And when by this teaching our people are well instructed about external things...the true Code shall shine forth by itself again"[88]. This point about Sircar's possibly having been the model for Bankim's *Cikitsak* does not seem to have been made before.

Campaign

Sircar wanted his institution to be like the Royal Institution and the British Association for the Advancement of Science. The Royal Institution came about in response to the dual revolution : industrial and the French (Berman 1976:2). It was established in 1799 by "improving landlords", who "decided to solve the problems of the poorer classes by trying to increase food production through scientific methods". However since the number of such landlords was too small to sustain the institution its base was soon expanded to include the professional classes. The British Association, founded in 1831, "was able to combine the cultivators of science into a body politic, an intellectual union which was able not only to offer advice to the government but also to secure attention to that advice"[89]. Both were irrelevant for India, which in Sircar's time neither had improving landlords nor men of science. Nor was there any counterpart in India of the strains caused in Europe by the industrial and the French revolution.

Sircar's Science Association project was not driven by any historical necessity. It did not fulfil any felt need. No wonder then that the type of funding and support Sircar had envisaged was not forthcoming. If Sircar was able to establish his institution and sustain it for three decades without any regular source of income or grant it was due to his tenacity. It of course helped that he was a successful physician and in the good books of the government.

We can distinguish between three phases in the campaign for and early sustenance of the Science Association, (i) The first phase extending from 1870 through 1874 during which Sircar tried to generate enthusiasm for the project on his own strength, (ii) The second phase from 10 March 1875 when the Lieutenant-Governor, Sir Richard Temple, showed interest in the project till the Association's inauguration by Temple on 29 July 1876. During this period, Sircar had to guard against subversion by Temple, raise funds and also gain legitimacy from the community through widespread support. This is the most fascinating part of the campaign often sanitized by the assertion that Temple supported the project, (iii) The third phase ran from the establishment of the Association till Sircar's death in 1904. During it Sircar sustained himself through large donations from wealthy people even if the support he received remained below his expectations.

The scheme when announced was well received by the press. A brief three-paragraph prospectus was published in the *Hindoo Patriot* on 3 January 1870, the influential mouthpiece of the British Indian Association. Through it "All well-wishers of Progress and of India" were "solicited to contribute their quota in furtherance of the project". The first donor was the eminent zamindar from Uttarpara, Joykissen Mookerjee, who paid a rather small sum of Rs. 1000. Iswarchandra Vidyasagar also contributed the same amount. It is noteworthy that donations from the landed class were not substantially higher that those from the professional class[90]. The first year of soliciting (1870) brought in 17 subscribers/donors. The number fell sharply after that : to seven in 1871, five in 1872 and only two in 1873 (including Sircar himself who gave Rs. 1000), and zero in 1874. The only saving grace was an unexplained contribution of 5000 rupees in 1870 from the Maharaja of far-off Patiala[91]. In 1874 the Maharaja of Kashmir's "Chief Justice and General Manager" Nilambar Mukherjee told Sircar that the Maharaja was willing to "patronize the Science Association" by paying the substantial sum of three hundred thousand rupees provided the institution was set up in Benaras, the ancient seat of learning, but Sircar was not ready to move away from his home ground[92].

Sircar found a valuable ally and comrade in the science professor at St Xavier's College, Calcutta, the Belgian Catholic priest, Father Eugene Lafont, S J (26 March 1837–10 May 1908), without whose "ungrudging and long, continued aid, the association would not have been an accomplished fact"[93]. As Nature put it in its tribute to him : "He was, however, an educationist rather than original thinker or original worker, but he did yeoman service for science in Bengal"[94]. St Xavier's College "is one which makes provision for the education of the domiciled European and Eurasian population of Calcutta and Lower Bengal, and in this way Father Lafont secured great influence among these classes. The college is also popular with native Indian gentlemen, and by his influence with Rajas and other men of note, Lafont was able to obtain several endowments for the purchase of scientific apparatus. This college possesses an

excellent supply of most costly lecture apparatus, especially of the kind necessary for popular science demonstration, in which way that college is better equipped than any in India[95]. Indeed in addition to his sterling qualities as an educationist[96], Father Lafont was a born popular scientific lecturer, and had a peculiar facility for putting dry facts in a popular way and an equal facility for making his lectures interesting by excellent experimental illustrations"[97]. He lectured at the Association uninterruptedly for seventeen years", that is from 1876 till 1893, and was "one of its perpetual Vice-Presidents"[98]. Whatever little gate money Lafont collected from his public lectures, he made over to the Science Association fund[99]. Like Sircar, Lafont was well honoured in his own life time. He was made a Companion of the Indian Empire in 1880 as also Officer de l'Academie de France (1886) His own King of Belgium made him a Knight of the Order of Leopold (1898). In 1877 Calcutta University appointed him a fellow of the Senate for life, which in turn elected him to the Syndicate a number of times[100] (Cal.U.1857: 463). Calcutta University awarded him an honorary doctorate in science in 1908, the year such a degree was introduced[101].

Born in Mons, south Belgium, Lafont was admitted into the Society of Jesus in December 1854. He was first educated in St Barbara's College, Ghent, and then (1863-1965) at Jesuit College, Namur (now a university). In the meantime, on 16 January 1860, the Belgian Province of the Society of Jesus opened St Xavier's College in Calcutta. On completion of his studies, Lafont was assigned to the Bengal Mission. He arrived in Calcutta in December 1865 to teach at St Xavier's College and remained associated with it till his end. In 1869, Lafont was ordained and made a vicar and then the priest at St Thomas Parish. He held the charge for more than twenty years, gaining "more popularity as an eminent preacher as time went by"[102]. Lafont's place in history however owes to science rather than faith. He was the Rector of the college from 1871 to 1878 and then again from 1901 to 1904. He visited Europe twice, during 1878-1879 for health reasons and in 1900 to see the Paris exhibition. Both times he brought back latest scientific equipment.

Lafont began by teaching to school pupils, but in 1867 when B A classes were opened he was transferred to the college section where he taught natural philosophy as also mental and moral philosophy. Lafont converted a small part of the terrace of the college building into a laboratory-cum-retreat, calling it his museum. "There he would sit till well into the small hours, tinkering with any gadgets he could lay his hands on or reading and preparing his lectures and sermons"[103]. Lafont furnished his museum with barometers and thermometers. Noting a sharp fall in the barometer reading of atmospheric pressure on the morning of 1 November 1867, he predicted the impending arrival of a severe cyclone, which dutifully made its presence felt the same evening. The prediction helped limit the damage and enhanced his prestige in the government circles as well as the native society. It also facilitated the establishment in the college of a valued meteorological laboratory[104].

Interestingly, Lafont did not know English when he arrived. However by 1870 he had mastered it well enough to be able to give forceful public lectures. This is also the time when Sircar appeared on the scene with his manifesto. Although donation-wise Sircar drew a blank in 1874 the year itself was scientifically very important because of the astronomical phenomenon of the transit of Venus across the disc of the sun seen on 9 December 1874. The event brought in an Italian team led by Pietro Tacchini (1838-1905) of Palermo Observatory, which set up an observing station in Muddapur with full support and participation from Lafont. The temporary event produced a permanent result. Tacchini persuaded Lafont to establish a spectroscopic observatory in his college for which he himself drew the plan.

Temple who held office from April 1874 till January 1877 (when he was transferred to Bombay as Governor) visited Lafont on 5 February 1875 accompanied by Mr. Mountstuart Elphinstone Grant-Duff. "By the end of the month, the Government of Bengal sanctioned a grant of Rs. 5000 towards the erection of the observatory, on condition that a like sum be gathered by private subscription before the end of March"[105]. Lafont's appeal for public funds was enthusiastically received. "A special performance was given at the Opera's theatre of Calcutta for the proposed Observatory"[106]. A total of Rs. 21000 was soon collected; construction of the building begun; and high-class equipment ordered from Europe[107]. It is unfortunate that the observatory failed to produce any results. Thus the first ever attempt to introduce basic modern scientific research outside the government failed to take off. Physical astronomy was institutionalized by the establishment of the imperial government's Kodaikanal Observatory in 1899[109].

It is likely that during Temple's visit to St Xavier's Lafont put in a word for Sircar (Jesuit archives may be able to confirm this hypothesis and provide other useful information). Sircar met Temple briefly on 10 March 1875 on the latter's invitation. After the meeting Sircar claimed that Temple had supported his scheme. In the absence of any official record of the meeting or reference to it in Temple's published memoirs it is not possible to say what exactly transpired at the meeting. We learn from Sircar's diary that he rather sheepishly "put on trousers and *chapkan [jacket]* and a *pagri [turban]*" for the occasion. "It appeared from the conversation we had with the Lt Governor that I could appear with my ordinary dress, even with my slippers"[110]. It is curious that Sircar did not record in his diary any thing more substantial than this about the momentous meeting.

Sircar's name does not figure at all in Temple's reminiscences. If Temple's official reports and actions, subsequent writings as also the official archives since made available are any guide it is very likely that Sircar was putting a spin on the outcome of the meeting for local consumption. Temple could not possibly have asked Sircar to start the institution as Sircar had envisioned. Temple supported the proposal only to the extent that he did not reject it outright. The relationship between the colonial government and the native leadership had already become quite complex. The government

was wary of opposing a cause that seemed to command native support. Native support in turn was forthcoming if the government seemed to be positively inclined.

The news that the Lieutenant-Governor had invited Sircar for a private audience enhanced Sircar's prestige among the native gentlemen[111] and changed the Association's fortunes. The first meeting of the subscribers took place five long years after the prospectus was issued but within four weeks of Sircar-Temple meeting. From 1870 up to the meeting, Sircar had been able to enlist only 32 subscribers (including himself) who paid an average of slightly less than Rs. 1700. Now a month's labour brought in as many as 35 donors even though their contribution per person was only Rs. 400[112]. By 1876 end Sircar had collected slightly less than a hundred thousand rupees from 171 subscribers. Of these 171 only 19% had enrolled before Temple came on the scene but they accounted for as much as 54% of the total amount. Later subscribers were more numerous but low-paying. This division suited Sircar fine because large number of low-paying subscribers spelt wide-spread native support for Sircar and bestowed legitimacy on the project. Once the project got going Sircar targeted big donors[113] (The number of subscribers dropped to 100 in 1901[114]).

At the first subscribers' meeting, Sircar described his recent meeting with Temple thus: "At this stage, an impetus comes from an unexpected quarter. His Honor, the Lieutenant-Governor, animated with an ardent love of the sciences, full of zeal for the introduction of science teaching into our educational institutions, accidentally hears of my project, and becoming acquainted with its scope and objects, so far as I could in a short conversation render them intelligible, asks me to start the Institution, and His Honor goes so far as to hint that some aid might be granted from Government" Curiously, as Sircar continued he himself did not sound very confident of the government support. He insisted rather defensively that while government aid would be most welcome, the institution would be "solely native and purely national". "And, I believe,...that His Honor, far from being desisted from granting us the contemplated aid, will come forward as generously with it, as His Honor has done with reference to the spectro-telescopic observatory of Father Lafont"[115].

Four days after the meeting, on 8 April 1875, Sircar sent a letter to Temple. The letter itself does not seem to be on record but we learn about its contents from the reply it elicited from Temple. The reply dated 3 May 1875 and sent by the private secretary quotes Sircar as "explaining that the meeting intended to be held on behalf of the Scientific Society had been postponed, and that it is proposed to hold a meeting at some future time, or whenever His Honor might be in Calcutta, and expressing your [Sircar's] hope that he will accord a general support to the Society's operations"[116]. Temple's detailed response to Sircar's letter is historically important; because it was the first time he was engaging himself with the native leadership on the important question of education. It would be instructive to place Temple's response in a larger context.

Quasi-disloyal discontent

Those were the days when the British were getting increasingly worried about the discontent among educated Indians, especially in Bengal, and were keen to modify the extant education policy. The colonial authorities indeed had many occasions to recall the blunt assessment of Lord Ellenborough (Viceroy 1842-1844) that English education was "the surest means of putting an end to British rule in India"[117]. His prescription in 1858 as the Secretary of State for India was : "Education and civilization may descend from the higher to the inferior classes, and so communicated may impart new vigour to the community, but they will never ascend from the lower classes to those above them; they can only, if imparted, solely to the lower classes, tend to general convulsion, of which foreigners would be the first victims. If we desire to diffuse education, let us endeavour to give it to the higher classes first"[118]. Lord Ellenborough would have approved of the 1870 founding of Mayo College, Ajmer, where "the sons of Chiefs, Princes and leading Thakurs" would be educated and taught British values.

Lord Mayo (Viceroy 1868-1872) wrote to a retired judge friend of his back home in England : "Let the Babu learn English by all means. But let us try to do something towards the three R's to Rural Bengal"[119]. Through a resolution dated 9 September 1869 the Government of India "expressed disapproval of the expenditure of large public funds on higher education to the detriment of the vernacular education". Beneficiaries of English education were not ready to accept this lying down. At a big public meeting held on 2 July 1870 in Calcutta under the auspices of British Indian Association, a resolution was passed saying that "nothing should be done to starve the English institutions for the sake of feeding vernacular schools"[120]. The resolution was moved by Joykissen Mookerjee and seconded by Sircar. Unmindful of the public sentiment Sir George Campbell, Lieutenant-Governor during 1871-1874, "pursued with energy the policy of encouraging primary education, discouraging the expansion of English education so eagerly sought by the bhadralok"[121]. He paid for his initiative with his job.

The Bengal middle class's hostility to the move can be gauged from the comments made in London in 1871 by Surendra Nath Banerjea who had then just joined the Indian Civil Service and would emerge as an important national leader. While participating in a discussion on a paper on "Popular education in India" read by an India-returned former civil servant, William Tayler, Banerjea loftily agreed that "We all recognize the great importance of mass education. We all know it would be impossible to civilize India without it". But he warned "it is unwise on the part of Government to withdraw the aid it gives to high English education for the purpose of mass education". Banerjea declared that "I, for one, would stand up for English education" as against the vernacular, adding that "We have had enough of the stories of the wars between gods and goblins in the Ramayana and other works. At the present moment we ought to give them an education which will make them...better men"[122]. Banerjea's use of the

term civilizing India in the context of mass education is significant. By this time the Indian baboos had starting speaking the language of the colonialists while the more sensitive among the British India's officials were taking a more progressive line partly out of conviction and partly with the object of putting the middle class in its place.

By now the English-knowing middle class was sufficiently large, self-assured and articulate to protect and advance its class interests. If Campbell rooted for grass-root level education, Temple sought solution in technical education. But Temple had no intention of going the Campbell way. Instead of forcing his solution down the native throats he tried to carry them along. If he eventually failed it was not for want of trying. In the "Lieutenant-Governor's Resolution" appended to the annual report of the Director of Public Instruction, Temple persistently put forward his thesis. Para 19 of the 1873-74 report asserts : "The Lieutenant-Governor would impress upon all concerned that one main object of scientific and technical education is to enable the rising generation in Bengal to earn their own living in practical pursuits, such as mechanics, engineering, surveying, mensuration, the higher branches of agriculture, the special culture of valuable products and the like...".

Continuing in the same vein in the next year's report (1874-75) Temple talks of "engrafting upon our education system (which is mainly of a general and literary character) of the study of practical sciences", on the ground that "If the educated youth are to find employment, there really is no alternative but that a portion of them should resort to those employments...for which practical sciences afford the indispensable qualification". Significantly the report records that the Lieutenant-Governor "has encouraged the wealthier and more enlightened classes of the natives to bestir themselves on this behalf". These unquestionable views were for record. Clues to the philosophy behind them come from a letter Temple wrote on 18 February 1875 to the Viceroy, Lord Northbrook, referring to the "quasi-disloyal dissatisfaction" displayed in the Bengali press[123]. "No doubt the alumni of our schools and colleges do become as a class discontented. But this arises from our higher education being too much in the direction of law, public administration, and prose literature, where they may possibly imagine...that they may approach to competition with us. But we shall do more and more to direct their thought towards practical science, where they must inevitably feel their utter inferiority to us".

Temple felt constrained in Bengal because the Calcutta University was under the direct control of the Viceroy[124]. But when he went to Bombay as Governor (1877-1879) he also became the Chancellor of Bombay University. He could now implement some of his ideas. He introduced drawing as an optional subject in the secondary schools. To him goes also the credit for the introduction of agricultural education in 1879 in the Bombay Presidency[125]. He also introduced B Sc. degree in Bombay. He later recalled : "By this time [1879] a project long in my contemplation was matured. This was the

conferring of Degrees in Physical Science. I thought at Bombay, as in Calcutta, that the superior instruction had been too exclusively literary, and had not been sufficiently directed to the Physical Science which might lead to practical results. At Calcutta I had been powerless to remedy this, but at Bombay I was Chancellor, and had power to nominate the Fellows of the Governing Body. As vacancies occurred, I had accordingly nominated men of science as well as persons of literary distinction. Thus the science element was by degrees raised to its due proportion. I remember that at the decisive meeting the requisite motion was made in my presence by Dr. (afterwards Sir Guyon) Hunter. Thus was passed a scheme of Science Degrees, more adequate than anything which had as yet been attempted in India"[126].

The decisive Senate meeting Temple refers to was held on 12 April 1879. It was unprecedented in the history of Bombay University that a business meeting of the Senate (other than convocation, *etc.*) was chaired by the Chancellor himself. The course for the proposed degree comprised English, mixed mathematics, physical geography and one of the following : physics, zoology, botany and geology. Since there was yet no Faculty of Science the B Sc degree was instituted in the Faculty of Arts. Science students came from Engineering College at Poona which offered geology, chemistry, botany, forestry and agriculture and from Grant Medical College in Bombay which established a chair in biology[127]. Bombay University thus became the first university in the country to award BSc in 1882[128]. Interestingly the prominent nationalist leader Sir Pherozeshah Mehta criticized Temple for his attempts to run the university as a government department[129].

Lieutenant-Governor's response to Sircar

With this background into Temple's own thinking we return to the letter written on his behalf on 3 May 1875 in reply to Sircar's letter of 8 April 1875. The reply pointedly refers to a "spontaneous and unaided effort on the part of the natives themselves to promote the spread of practical science among the people of Bengal". Use of the term unaided suggests that Temple had no intention of financially supporting Sircar's scheme. Mention of practical science is Temple's way of pointing out where his own preferences lay.

Conceding for the sake of politeness that "Science may be pursued for its own sake in the abstract and for the mental pleasure it affords" and "there doubtless are many native gentleman in Bengal who will thus pursue it", the Lieutenant-Governor went on to painstakingly argue that "Science also may be made to add immeasurably to the national wealth and so to afford lucrative employment to numberless persons according to their qualifications and acquirements...". "Moreover by these means not only will many new industries be introduced into Bengal, but almost every one of the old established arts and manufacturers of the country may be rendered more useful and remunerative than at present" (Bengal and indeed the whole of India today could

advantageously use Temple's blueprint prepared 120 years ago!).

Temple wanted that the scheme "details be settled by yourselves without any specific guidance from the State". He expressed confidence that Sircar and his supporters "will be able to elaborate plans calculated to redound to the material benefit of your countrymen". The letter closed with Temple's "cordial and earnest wishes for your practical success". The use of the terms like material benefit and practical success leaves no doubt about the direction Temple wanted the native initiative to take. But he was not ready to confront the Calcutta middle class. He therefore decided to enlist native support for his own scheme. More specifically he tried to dovetail his scheme to the ongoing municipal factional politics.

If colleges were churning out a large number of unemployed and unemployable young men whose discontent was a major cause of worry for the colonial government there were also now after fifty years of English education a significant number of well-educated, articulate, bright young men who could look the empire in the eye and who now wanted a community leadership role. This leadership was currently in the hands of the landed class through the British India Association which had been formed in 1851 in time to influence the 1853 charter to be granted to the East India Company by the British Parliament. Though an organization of those entitled to privileges by accident of birth it still had place for the upwardly mobile members of the middle class. The arrangement was mutually beneficial. The upper crust could use the middle class' intellectual prowess and the ability to write and argue[130]. The middle class in return received social prestige, built contacts and acquired a forum. The 50-rupee-a year membership of the British India Association was a proof, because proof was needed, of having arrived. But now this middle class was ready to strike out on its own. Fortunately for it the government for its own reasons was keen to reform the extant municipal corporations. So far the native representation had been through nominated members. The government appointed justices of peace from among the "Hindu property-owners and British tradesmen" who in turn constituted the corporation.

In 1875 an act was passed providing for a partially elective corporation for Calcutta. The self-made professional class now saw a bigger role for itself. Only it was not quite clear within its own ranks as to what was to be done with the past baggage as represented by the landed class. One faction led by Sisir Kumar Ghose owner of *Amrita Bazar Patrika* (who had moved to Calcutta in 1871) and Dr. Sambhu Chandra Mookerjee (1839-1894), editor of the *Mookerjee Magazine* founded a political organization, Indian League, on 25 September 1875. This faction wanted a clear break with the past elitist leadership. The other faction which had old family and social ties with the old guard was more moderate and favoured a smooth transition (It included Anand Mohan Bose, Surendra Nath Banerjee and others). It is this latter section which was by the side of Sircar. It eventually prevailed politically with the founding of the more representative Indian Association, on 26 July 1876.

Since the Indian Association leadership was supporting the Science Association Temple decided to enlist the support of the rival Indian League to further his polytechnic plan. The conflict between the Indian League and the Indian Association leadership was a factional fight untainted by any economic ideology. Indian League leaders may have been upstarts compared to those of the Indian Association[131] but the former's support for Temple's polytechnic was certainly not driven by any commitment to the cause of the artisans. Indian League was supporting the Lieutenant-Governor not technical education. It was opposing the people behind Indian Association; it was not supporting the polytechnic.

The fact that the Lieutenant-Governor had decided to operate through a section of the native middle class rather than take a public stand himself lent intensity to the enrolment campaign in favour of the Association. Temple's letter was published in the press and commented on editorially. The influential *Hindoo Patriot* (15 May 1875) which had consistently supported Sircar exhorted the Bengali Babus to donate liberally for the Science Association project, since "Mohamedans of N. India have already raised Rs. 200,000/- for their Anglo-Oriental Fund". At the same time it urged the government to give a grant-in-aid[132].

The second subscribers' meeting was held on 20 November 1875 which appointed a provisional committee under the chairmanship of Father Lafont to work out the plans for the Science Association. Its report along with "a sketch of the scheme" by Sircar was considered on 16 December 1875. Sircar's sketch stated that "The object of the Association is to enable the natives of India to cultivate Science in all its departments, with a view to its advancement by original research and (as it will necessarily follow) with a view to its varied applications to the arts and comforts of life". Obviously reference to the arts and comforts of life was an afterthought added for form's sake as a concession to Temple's stated views.

The provisional committee was still banking on support from the government and its sense of noblesse oblige : "Sir Richard Temple has already evinced the most lively interest in the project, and it will not be too much to believe that Lord Northbrook will do the same. And when the Rajas, Maharajas and Princes, who will gather in this our capital to honor the royal visitor, will learn this, they will, if we are not much mistaken, very gladly join, as one of them the Maharaja of Patiala has already long ago joined, in founding and endowing an Institution which, while, it will be the most fitting memorial of the Prince that can be conceived, will grandly fulfil the mission of England, the restoration and elevation of the people of India"[133].

The campaign for more donations continued and the third subscribers' meeting was called on 15 January 1876 under the chairmanship of Temple. In the meantime Temple had been active on his own agenda. Indian League was formed on 25 September 1875. It called a public meeting of "Native Gentlemen, Chiefs and Rajas" on 25 December 1875 under the chairmanship of Temple where a resolution was passed

"to found an Institution for instructing in the various branches of the Physical Sciences in the name of His Royal Highness the Prince of Wales, to commemorate the visit of His Royal Highness". Interestingly, the resolution was proposed by Sircar's ardent supporter Lafont[134]. In his presidential address Temple made a far-sighted remark. He advised the organizers : "I do hope that if the large sums you expect are realised, the money will not be spent in building a structure. A structure is a very good thing in its way, but what is of more essential importance is the means of paying the salaries of the lecturers. You must remember that the lecturers and students form the living part of an Institution like this. To that purpose the money should be primarily devoted; that is, money should be invested, and the proceeds devoted to the payment of the salaries of lecturers"[135]. As it turned out the Indian League never reached a stage where it could follow or flout Temple's advice. Sircar could have benefited from this valuable piece of advice but he chose to invest in the structure than in the living part.

Since the date for the third subscribers' meeting would have been fixed in advance in consultation with Temple there can be no doubt that he contrived to make sure that the practical sciences school meeting was held earlier. Indeed at the 15 January 1876 subscribers' meeting, in his presidential remarks Temple declared that he "would be glad if any individual influence could be the means of drawing together a similar Association formed in the city under other auspices". Temple took this opportunity to reiterate his own thesis. He declared that the objects of both the initiatives "are ultimately the same, namely, the improvement of the rising generation to the Western knowledge of science, while it will also afford those who cannot find a living in the public service and the Bar, a means of earning a good livelihood by practical pursuits, such as those of a scientific forester, a gardener, a civil engineer, a surveyor, a chemist and the like. I am sure you will agree with me that the learned professions, as they now exist in Bengal, are not sufficiently extensive to furnish employment to all those educated men who are annually, constantly seeking for employment. There is, therefore, nothing for these young men, if they wish to live respectably, but for them to put their shoulders to the wheel – the wheel being the cultivation of the practical sciences"[136]. Temple's remarks were greeted with "loud cheers" but did not bring about any change of heart.

The meeting formally resolved to set up Indian Association for the Cultivation of Science with Temple as its ex-officio chairman. The matter however did not end there. A joint meeting of the subscribers to the Science Association and to the Indian League's polytechnic was held on 28 January 1876 with Temple in the chair to examine the possibility of the merger of the two schemes. The idea was formally given up when of the present only 5 voted for amalgamation and 32 against. But more significant than the vote count were the arguments.

In the early days of the British rule over Bengal the social relationship between the British officials and the native leadership was quite cordial cemented as it was by

mutually beneficial financial transactions. More basically the British in Bengal were dealing with a social class they themselves had created, enriched and socially elevated[137]. In this setting Indians had no difficulty in playing second fiddle while learning English language, literature and law. But by the 1870s the Empire had hardened and the native leadership had also gained in confidence. Given its class characteristics it was not willing for the second round of apprenticeship that technical education entailed. The well-respected scholar Dr. Rajendralala Mitra asserted that "no nation on earth had shown a higher appreciation of learning for its own sake than the Hindu. For three thousand years and upwards their ancestors had cherished Sanskrit learning for its own sake, and need it be doubted that their descendents would not be equal to the sciences of the present day?"[138]. There could not have been anybody in the audience to remind the learned orator that three thousand years ago the production of wealth was based on frozen empirical technologies which did not require any formal learning while the 19th century production of wealth required learnt skills. Learning for its own sake had appealed to the Brahmins then and had an equal fascination for the new social class British rule in Bengal had created. But farmers and artisans would have benefited from modern science. Thus while Europe was artisaizing science it was sought to be Brahminized in India in keeping with the caste composition of the middle class.

Mitra warned Sircar : "do not attempt to make your institution a school of technical education in the industrial arts...nor attempt to make it self supporting by producing remunerative art work in your laboratories. If you do, you will disappoint your pupils". Mitra's admonition had a history behind them. In 1854 a School of Industrial Art was set up under the auspices of a newly established Society for the Promotion of Industrial Arts, with Mitra as the secretary and a British engineer Colonel H Goodwyn as the president. The school hoped to offer three-year training to about 30 students in "the arts of engraving, modelling, printing, architecture design, ornamental pottery and porcelain manufacture, *etc.*" so as to open "new branches of employment for middle and educated classes"[139]. The idea was "to lead these classes...to regard with respect and honour the manual labour necessary for the practice of these arts". The school was taken over by the government in 1862. Its report for the year 1866-67 is rather discouraging. Noting that the majority of students came from "the middle and poorer classes of the Natives", the Principal, H H Locke, lamented that "several instances have occurred of parents being compelled to withdraw students from the School and relinquish their intention of obtaining them a professional training as draughtsmen, owing to the necessity for their procuring some kind of office or other employment". He suggested that "If Government or any of the native gentlemen...would offer one or two scholarships...to induce students to remain at their studies a year or two longer than at present, it would ensure the complete education of a few well qualified draughtsmen". No support either from the government or native leadership

seems to have been forthcoming. The school did succeed in diffusing the lithographic technology but by the time half-tone block prints were introduced the school had changed its colour[140]. Under the leadership of E B Havell and Abanindranath Tagore it became a fine arts institute (since re-named Government College for Art and Craft).

Father Lafont bluntly stated that the pro-polytechnic Indian League wanted "to transform the Hindus into a number of mechanics requiring for ever European supervision"[141]. If the Indians drawn from artisan castes had been consulted they would not have minded their utter inferiority to the foreign rulers for one or two generations as a price for upgradation of their traditional skills. But the native leadership was in the hands of upper castes well known for their disdain of manual work. It had taken them two generations of study of western law and literature to claim equality with the rulers. They wanted science to be cultivated at the same level. Since this class knew Shakespeare as well as if not better than the British themselves it believed that its edifice of science should be supported by and be an extension of the British effort.

European missionaries acted as a bridge between the colonial rulers and native upper class interests. In 1886 there was a suggestion afoot from Charles Henry Tawney, the acting director of public instructions, backed by the Government that technical education should be introduced at the school level and the institutions which would not arrange technical education would cease to receive Government aid. Father H Neut (1845-1921), the then Rector of St Xavier's and a colleague of Lafont's, opposed the scheme saying that "To begin the technical studies in the school itself is to prepare a generation without elevation or grandeur"[142].

Exercising his executive powers and independently of the Science Association the Lieutenant-Governor resolved to establish a number of surveying schools observing that "the foundation of these schools will only be a preliminary step towards establishment of technical schools for the teaching of handicrafts and the improvement of several kinds of manual industry". The editorial comment in the influential *Hindoo Patriot* (31 January 1876) was on predictable lines : "This will of course improve the condition of the masses, but will not affect the educated classes".

Finally yielding to the demands of the educated classes, the Lieutenant-Governor gave his approval to through a notification gazetted on 23 February 1876. The notification itself is dated 21 January 1876, that is a week before the joint meeting. Unless the official date is a misprint the notification must have been back-dated because it could not possibly have been issued before the outcome of the joint meeting was known. Through this notification the Lieutenant-Governor noted that "the realization of so large an amount of donations as that promised would indicate munificence on the part of many native gentlemen for the good of their countrymen". Making it clear that "the members should depend on their own independent exertions for the attainment of success", the government decided to purchase a suitable building (for Rs. 40000), and make it available free of charge for the Association. It is

noteworthy that the government saw the Association as a science college. As the Annual Report on Public Instruction for 1875-76 in Bengal put it (para 451) : "The objects of the institution are to provide lectures of a superior kind in science, especially general physics, chemistry and geology, mainly for students who have already passed through school or college or have otherwise attained some proficiency in these respects".

By another minute dated 18 April 1876 Temple considered the proposal of the Indian League for the establishment of a technical school. "The promoters of the institution having agreed to invest two lakhs of rupees (expected as donations) in Government securities, so as to produce an income of Rs. 8000 p.a., an equal grant of Rs. 8000 was made by His Honor". It was officially noted that "Among the donations, one of Rs. 40000 by Rai Luchmipat Singh Bahadur of Asimgunge has already been invested in Government securities" (Annual Report of Public Instruction in Bengal for 1875-76, para 453). Interestingly *Hindoo Patriot* (26 February 1876) pointed out that Luchmipat's contribution was made to the Government for Berhampore College, and "he merely agreed for the diversion of funds to the Indian League at the request of Sir Richard Temple". As is well known nothing came out of Indian League's officially supported initiative for a technical school while Science Association was inaugurated by Temple on 29 July 1876 (see Table 1 for a summary of chronology).

Lectures

While the Science Association was in the subscription stage Calcutta University was introducing science into its system. Chemistry stood apart from other scientific disciplines; it was a part of the British Indian governance. Ghazipur opium factory had a post of opium chemist (When was it introduced?). Various government departments of industry hired industrial chemists while Calcutta municipal corporation maintained a chemical laboratory. Unlike other industrial products it was not very viable to import sulphuric, nitric and hydrochloric acids. Being hazardous, these chemicals could only be brought in as deck cargo, which entailed heavy freight making their landed cost prohibitively high. A Scottish immigrant Dr. David Waldie (1813-1889) who arrived in Calcutta in 1853 set up chemical works for manufacturing mineral acids in large quantities. Limited amounts were produced by three or four small units through "primitive and wasteful methods"[144].

It would be instructive to briefly review early attempts at introduction of science education. As is well-known Hindu College (or rather its junior branch) was opened in January 1817 as a community initiative. Hindu College applied for a government grant in July 1823. The government agreed and appointed a general committee of public instruction which was asked to examine the possibility of the introduction of "European Science as far as practicable"[145]. The committee recommended the appointment of a professor of experimental philosophy, and proposed that the instructions "embrace the

Table 1. Indian Association for the Cultivation of Science : Chronology 1869-76.

1869	Dec. 8	Dr. Mahendra Lal Sircar publishes "On the desirability of a national institution for the cultivation of science by the natives of India" in his *Calcutta Journal of Medicine* (nominally dated Aug. 1869)
	Dec. 13	*Hindoo Patriot* welcomes the proposal
	Dec. 20	Article published as a pamphlet
	Dec. 29	*The Englishman* comments encouragingly
1870	Jan. 3	Prospectus issued in *Hindoo Patriot*, soliciting donations
	Jan. 29	First two donations received
1872	Feb.	Sircar lectures at Bethune Society and at Uttarpara Hitkari
1875	Mar. 10	Sircar meets Lieutenant - Governor Sir Richard Temple
	Apr. 4	First meeting of Science Association subscribers
	Apr. 8	Sircar writes to Temple
	May 3	Temple replies to Sircar
	Sep. 25	Indian League established
	Nov. 20	Second meeting of subscribers, attended by Temple. Board of Trustees appointed
	Dec. 16	Report of Provisional Committee; Sircar sketches the scheme
	Dec. 25	Indian League meeting with Temple in chair proposes to set up a school for practical sciences
1876	Jan. 15	Third meeting of subscribers, with Temple in chair
	Jan. 28	Joint meeting of Science Association and Indian League
	Feb 23	Lieutenant-Governor's minute gazetted (nominally dated 21 Jan.) sanctioning Science Association
	Apr. 6	Temple contributes Rs 500 to the Association fund
	Apr. 18	Lieutenant-Governor's minute sanctioning League's polytechnic
	Jul. 26	Indian Association formed
	Jul. 29	Indian Association for the Cultivation of Science inaugurated

following sciences : Mechanics, Hydrostatics, Pneumatics, Optics, Electricity, Astronomy, Chemistry". The committee further suggested that "it would be advisable to separate Chemistry from the rest, and to appropriate a practical course to that science alone"[146]. Accordingly, one Mr. D Ross from the Calcutta mint was appointed a lecturer in chemistry in 1824 in the Hindu College, "but his knowledge of the subject seems to have been very poor – at any rate his pupils were not at all favourably impressed by his lectures. The only thing he was conversant with was Soda, and he was never tired of dilating on its properties. No wonder one of them Krishnamohan Bandhyopadhyay (afterwards famous as Rev. K M Banerji) contributed to the papers a sarcastic article entitled "Soda and his Pupils"[147].

Chemistry had to wait another fifty years for a second chance. In the meantime 1863-1975 Henry Francis Blanford (1834-1893) of the Geological Survey of India served as a broad-spectrum professor of natural science at the Presidency College, Calcutta where he taught outlines of a number of subjects ranging from physical geography to

physics[148]. In 1872 Calcutta University permitted First Arts (F A) students to opt for chemistry in place of psychology. Also BA was split into two streams : the traditional A course (literature) and the new B (science) course. Two years later chemistry (along with physical geography) was made a compulsory subject for the B course while two papers in physical science were made optional[149]. Science gained immediate popularity. In 1874 out of the 96 regular FA candidates from the Presidency College as many as 83 opted for chemistry. Similarly in the BA examination 60 out of 84 opted for science in the third year and 48 out of 84 in the fourth year[150].

It was left to the far-sighted and therefore unpopular Lieutenant-Governor Sir George Campbell (tenure 1871-1874) to ask for specialist professors in chemistry and botany[151]. [Sir] Alexander Pedlar, joined in 1874 at the young age of 25 and later rose to become the Vice-Chancellor of Calcutta University. For his own researches done in India, including on cobra poison, he was elected a Fellow of the Royal Society in 1892. He can truly be called the founder of chemistry education in India. Similarly [Sir] George Watt came as a professor of botany at the Hughli College and later moved to Krishnanagar.

"Under instruction from the Government" Pedlar "came with a considerable supply of chemical apparatus" and started practical classes in 1875[152]. Presidency College, Calcutta was the best funded college in the whole of the country and the only one in Calcutta, apart from the Jesuit St Xavier's, which offered science. Other private colleges did not have the resources to do so. Their students were however permitted to attend classes in Presidency College on payment of a small fees. The popularity of science can be gauged from the number of these "out-students". The number was four in 1871 and zero in both 1872 and 1873. But with the arrival of new equipment number rose rapidly. It was 14 in 1874; 21 in 1875; 45 in 1876; and as high as 63 in 1882[153].

Pedlar recommended appointment of an additional member of faculty. The addition, in 1889, was P C Ray which turned out to be historically significant. The Presidency College chemistry laboratory refurbished in 1893 helped P C Ray attain international fame as an experimental chemist as also to found a flourishing school (see below). India would go on to establish a successful chemical industry which in turn has led to a pharmaceutical industry now known the world over for its ability to produce generic drugs at low cost. Although facilities existed in other science subjects they did not receive the same attention as chemistry because chemistry was a compulsory subject while the others were not. Notwithstanding the science facilities in the Presidency and St Xavier's Colleges the general lack of laboratory facilities made science education under university auspices mostly a theoretical exercise. Those days "it was possible for a BA student to pass his University examination in chemistry without entering a laboratory or touching a test tube"[154].

Within a month of its inauguration the Science Association embarked on its regular lecture series. Much important documentation related to Sircar's scientific

activities is compiled in Biswas (2000) and Biswas (2003), including the extant annual reports. In the early years, Sircar published in a book form essays (as he called them) on the Science Association along with "the opinion of the Press thereon". The 1880 edition contains prefaces written by Sircar in March 1872, December 1875, January 1877 and April 1880. The contents of the book minus the prefaces find place in Biswas (2003). The prefaces, not reprinted before, are reproduced here as Appendix II. Apparently the oldest published annual report of the Association is of the seventh meeting read in 1884. It would be instructive to see if earlier, presumably unprinted, reports are extant any where. Not surprisingly the first lecturer was Lafont in physics who continued till 1893[155]. Sircar began in 1878, while a chemistry lecturer, Tara Prasanna Roy, could be found only in 1879, who continued till about 1885. His assistant, Ram Chandra Dutta (1851-1899), otherwise a chemical analyst in the Medical College and one of the earliest disciples of Ramakrishna Paramhans, took over from Tara Prasanna and continued lecturing till his death in 1899[156]. The newly appointed Presidency College Physics Professor, J C Bose, began practical classes in 1885 but discontinued them 1888 end[157].

In 1887 lectures in mathematics and geology were introduced. The mathematics lecturer was Asutosh Mookerjee (1864-1924), son of a successful medical practitioner who was a personal friend of Sircar's[158]. Asutosh obtained his MA in mathematics in 1885 from Presidency College. The next year he received the prestigious Premchand Roychand studentship as also another MA in "physics"[159]. While still a student he published some mathematical research papers which were well received. In 1887 the Director of Public Instruction, Sir Alfred Croft, offered him appointment as assistant professor carrying a monthly salary of Rs. 250 (like P C Ray). But Asutosh wanted to be placed in the superior European scale (as J C Bose had been). Since this was not possible he decided to leave mathematics for law, it seems, on the advice of Sir Gooroonath Banerjee (1844-1918) who also had a university degree in mathematics but made a successful career in law[160]. Asutosh obtained bachelor's degree in law in 1888 from City College and started his practice the same year after serving his articleship under Rashbehary Ghose (1845-1921). Because of his own love for mathematics and family relations with Sircar he began lecturing at the Association in 1887 on mathematical topics and continued till 1891. Characteristically his lectures included some new material also. During this period he published as many as 13 research papers in the *Journal of the Asiatick Society* of Bengal, Part 2[161]. In 1893 he published his book *Geometry of Conics*. Meant for the "beginners of the subject", it was "highly received" and "ran into many editions"[162]. A last ditch attempt was made to keep Asutosh in mathematics. Gooroodas Banerjee, by now (that is during 1890-1892) the Calcutta University's first Indian Vice-Chancellor (1890-1892), failed to collect even such sum as would give Asutosh a modest income of Rs. 4000 a year[163]. Mathematics lost Asutosh for ever. He went on to get a doctorate in law in 1894 and

became a high court judge in 1904. It is not possible to speculate on what Asutosh might have achieved as a mathematician but history remembers him as a great educationist. His association with Calcutta University began in 1889 when he was nominated a fellow of the Senate. He served as the honorary Vice-Chancellor for four consecutive two-year terms during 1906-1914 and then again during 1921-1923 (see below).

India's first geologist Pramatha Nath Bose (already referred to) lectured at the Science Association during 1887 and 1888. Teaching in life sciences was introduced in 1894. All lecturers were honorary. Whatever gate money was collected went to the Association. The gate money was more symbolic than substantial; it could be as low as four rupees[164]. These lectures attracted science-hungry students from private colleges. Thus during 1881-82 P C Ray, a regular student at Metropolitan Institution (since renamed Vidyasagar College after its founder), attended lectures not only in Presidency College but also at the Science Association for additional instruction. Presidency College's ability to attract out-students irked Sircar. He even "made a representation to the Government requesting it to discontinue allowing students from private colleges to attend lectures at the Presidency College as otherwise the Science Association lectures would be more or less empty"[165]. The "admissions were getting larger year to year and B course (Science) growing to be popular"[166]. As private colleges opened science classes of their own, the Science Association lecture-rooms became "almost deserted"[167]. The annual report for 1892 noted "with satisfaction" in 1892 that "some of the lady students from La Martiniere Institution and the Doveton College attended the lectures regularly" while "The practical demonstrations in Chemistry were attended by two lady students, both of the Calcutta Medical College". But at the same meeting taking note of increasing redundancy of the Association because of the laboratory facilities created by the colleges Sircar proposed to institute "two classes of lectures, one elementary for instruction of the masses, and advanced for the enlightenment of those who have already passed through the portals of the University, or any how have mastered the discovered facts of physical science"[168].

Bowing to the ground reality in 1893 the Association got itself affiliated to the Calcutta University in physics and chemistry up to first examination in arts. In 1899 this affiliation was secured for B course of the BA degree. From 1895 a small number of students from private colleges were permitted to work in the Association laboratories to prepare themselves for the MA degree of the Calcutta University[169]. In 1896 Sircar's lecture on heat was attended by about 200 persons, most of them being students of the Bangabasi College. The audience included the Principal also[170]. In November 1899 when Sircar called on the Lieutenant-Governor, the latter enquired how the "college" was doing, meaning the Science Association. Sircar's reply was : "not satisfactorily"[171].

An active member of the executive committee of the Science Association was Keshub Chunder Sen whose daughter was married into the house of Cooch Behar. Sen

helped Sircar by "securing donations from the Cooch-Behar Raj and other rich magnates"[172]. In 1890 Maharaja of Cooch Behar started contributing Rs. 100 every month in aid of a permanent professorship which was earmarked by the Association for chemistry. But since the amount was too small for a full-time appointment it was used to remunerate the chemistry lecturer, Ram Chandra Dutta, who had been gratuitously teaching for years; see above[173].

Sircar was very clear in his mind that "the Association cannot carry out its work with honorary lecturers"[174]. "Their ought at least to be two professorships" each requiring an endowment of a hundred thousand rupees. Although he dubbed the amount "modest" he knew it would not be forthcoming spontaneously. He therefore enlisted the support of the Viceroy and did not mind attributing the authorship of the idea to him. While inaugurating the new building in 1884 (see below) in the presence of a vast gathering comprising "upwards of seven hundred European and Native gentlemen" in addition to the Association members Lord Ripon "cheerfully and readily" agreed to lend his name and even contributed Rs. 1000 towards the endowment. He light-heartedly referred to the rather "disagreeable" situation of paying to get his name perpetuated[175].

Sircar had naively believed that the targeted amount would be collected "before the year expires". But Ripon left office in 1884 itself. Sircar sought support for the professorships in the Viceroy's name. At the eleventh annual meeting held in 1888 he said : "If ever there was a project which deserved the enthusiastic reception of the people of this town it was one projected for their benefit by Lord Ripon; twice urged on their attention in public by him, subscribed to by him, and to be called after his name"[176]. But three years' labours yielded no more than Rs. 19950. In 1891 Sircar hoped that "the country, of which Lord Ripon is such a true friend, will not allow the project of the first professorship, which it was resolved to name after the noble Lord, to remain a myth to our lasting disgrace". The disgrace lasted half a century. It was only in 1937 that a Ripon professor (Sir Lewis Leigh Fermor) could be appointed[177].

The Ripon fiasco however failed to deter Sircar[178]. In August 1896 on the occasion of David Hare's 54th death anniversary the Association resolved to establish Hare professorship and duly invited public subscriptions with predictably negative results[179]. Finally on the death of Queen Victoria in 1901 a new professorship was announced in her name but "there were only two donors"[180]. Sircar had better luck with buildings and instruments.

Instruments and buildings

When Sircar was trying to win support for his Association in competition to the government-supported Indian League, it was necessary to make the subscription base as broad as possible. But once the Institution had been established Sircar turned to the wealthier sections of the society to which his profession and proximity to the government gave him access.

Science Association began with a corpus of about Rs. 80,000. Out of this, a sum of Rs. 20,000 was earmarked for instruments. To this sum was added the handsome contribution of Rs. 25,000 by Kally Kissen Tagore in 1878[181]. Several instruments were purchased locally. For the rest, money was placed in the hands of Father Lafont who was proceeding to France for health reasons. One of the new equipment was a state-of-art instrument, a 1878 invention, Crookes tube, a proto-type of all future cathode ray tubes. When high voltage was applied across the tube the rarefied gas inside glowed. Obviously some sort of rays were being emitted by the cathode. It was generally believed that the rays were waves. Sircar however discounted the wave nature of these rays and believed them to be ions. On 18 March 1880 the Viceroy Lord Lytton came to the Science Association to attend Sircar's lecture-demonstration on Crookes tube and invited him to perform at the Viceregal residence on 31 March 1880 before a select audience. For the Britishers in India Sircar became a window on the latest on the scientific front back home. Sircar approvingly quoted the *Hindoo Patriot* to say that "The Viceroy's visit marked "an epoch in the history of the Association", adding that "The founders and supporters of the Institution have now the best encouragement for their undertaking"[182].

The event is described in purple prose by Ghose[183] : "Two eminent European professors of science were present there and they directed their arguments in a sophisticated way against Dr. Sircar. But the wheels of mica placed at forty-five degrees revolved like a well conduced machine. They still argued at the sacrifice of their senses. The potash-bulb tube came to silence their mouths. This was the triumph of science". Ghose apparently forgot that the real triumph of science lies in the controversy rather than its resolution. Eventually, J J Thomson showed that the rays were in fact particles since named electrons. Kariamanickam Srinivasa Krishnan (1898-1961), Raman's collaborator and later successor, "used to say that Mahendra Lal came very close to the discovery of electron"[184]. The Viceregal invitation to Sircar "made some sensation in its time and is remembered by many up to this day [1904]"[185]. It was however the interest taken by the next Viceroy, Lord Ripon, that launched Sircar into a higher orbit.

In 1880 the Association decided to purchase its premises from the government for Rs. 30000, remodel it, add a 500-capacity lecture theatre and build a tower the upper part of which would house an astronomical observatory[186]. The September 1881 purchase of the building from the government[187] meant the end of any government control and the transformation of the Association into a private club[188]. Hindoo College had started as a private body in 1817 but opted six years later to accept government control in lieu of financial aid. In contrast, Science Association started with government aid but jettisoned it four years later. Government grant and say in management would be revived half a century later; see below.

In 1882 the munificent Kally Kissen Tagore, a high-paying patient of Sircar's[189], promised another Rs. 5000 towards the building fund in addition to the Rs. 25000

already committed. Sircar was keen to benefit from rivalries within the Tagore clan but was at the same time careful not to be harmed by the jealousies. On Sircar's request, Kally Kissen agreed not to announce his donation before Sircar got one from Kally Kissen's kinsman the more famous Maharaja Jotindro Mohan Tagore "as in that case the Maharaja might not subscribe at all"[190]. In 1882 Sircar was a member of a delegation that called on Ripon. Another member was the Maharaja of Darbhanga whom Sircar was able to touch for Rs. 5000[191].

The foundation stone of the new building was laid by Ripon on 13 March 1882 who returned two years later to the day for the inauguration[192]. Earlier in January 1882 Sircar had noted in his diary that "the Maharaja of Vizianagaram may be got to subscribe through Dr. Rajendralala Mitra. But it is doubtful if the latter (though our Vice-President) will speak a word in favour of the Association"[193]. The most substantial contribution to come Sircar's way did emanate from the Maharaja but through a different route. As it happened the Maharaja was a patient of Sircar's homeopathic mentor Babu Rajendra Dutt, who persuaded the Maharaja to give Rs. 50000 during 1889-1890 for the construction of a laboratory, named after him[194]. It is this laboratory, backed by a workshop, which would become known the world over as the seat of Raman's researches[195]. Ironically glory for Science Association came after the demise of its founder who died a rather disappointed man.

Many Viceroys and Lieutenant-Governors had entered the Science Association premises before only find a mention in the next day's newspapers. But when in August 1907 the young government officer Raman walked into the Association he was aiming at a mention in the text books. He was interested in scientific research. Could he use the Association facilities in his spare time? Amrita Lal Sircar the new general secretary who all his life had been intimidated by his illustrious but domineering father was now the elder statesman. Promptly he enrolled Raman as a life member and handed him the laboratory keys. Almost immediately his work won world recognition. Many universities, including Calcutta, sent their young researchers to work with Raman[196]. He himself moved to Calcutta University in 1917 as a physics professor but continued his research work in the Science Association. Raman was elected a fellow of the Royal Society of London in 1924 following which the colonial government felt honour bound to support the Science Association. Accordingly an annual grant was forthcoming from the government 1925 onwards[197]. As is well known Raman discovered the effect since named after him in 1928, got the Nobel prize two years later and left Calcutta in 1933 for Bangalore to take over as the Director of Indian Institute of Science. Krishnan was now appointed Mahendra Lal Sircar Professor. The government monitoring that had ceased in 1880 with the Association's buying the government building was restored in 1935 when a government representative was provided with a seat on the management council in return for an assured government grant[198].

Critique

Barely two years after the establishment of the Science Association, that is on 5 September 1878, at a meeting of the all powerful committee of management, the Chairman and the Association Vice-President Rajendralala Mitra created what Sircar dubbed a "great row". Mitra made some "remarks about accounts, *etc.*" which provoked Sircar to lose his temper[199]. The minutes prepared by Mitra were "couched in language which shows disrespect to the Secretary, and unless these are modified, I must resign" [Sircar wrote in his diary four days later]. However it was Mitra who quit but not quietly. Shortly after Lord Ripon had laid the foundation stone of the Association building Mitra submitted his resignation to the Association President, the Lieutenant-Governor Sir Ashley Eden. In his letter Mitra levelled a number of charges. It is reprinted in full, probably for the first time since 1882, here as Appendix III[200].

If Mitra had had his way money would not have been spent on buildings but on hiring full-time staff. The offered courses did not constitute "systematic teaching". "The records of examinations, questions and answers, the results, *etc.*, were not being maintained properly". The Association was "purchasing costly and sophisticated instruments" which were "the most showy, and best adapted for public exhibitions" rather than the more useful ones from a tutorial point of view. "The idea of paid lecturers cannot now be realised. With half the funded capital now spent, the Association must now be satisfied with rich instruments and a big house with none to teach there except volunteers". "As in the case of instruments so in the case of house (a lecture theatre for 500 people), show and ostentation have been preferred to honest, diligent work". Mitra (1882) then goes on to make some serious alligations. According to Mitra as long as the Association was located in a building provided by the government its "educational work" was "open to inspection of Government officers". "It was soon, however, discovered that such inspection would not be beneficial to the Association, and the house, therefore, was purchased...". Mitra alleged that the grant of scholarships was not on the basis of any proper examination and no records were kept. "The Secretary reported so-and-so should have the scholarship and the prizes, and the committee acted upon the recommendation".

The resignation letter was reproduced by the newspapers and elicited some comments. But Sircar and his friends decided not to react in public. Privately Sircar wrote that "the malicious Doctor has uttered the grossest misrepresentations and falsehoods"[201]. Curiously Mitra's resignation does not figure in the Association's official records[202].

Dr. Sircar had loftily declared in 1875 that the "primary object of the Association" was "the restoration and elevation of the people of India to the rank among nations which they have lost and which they might be made to attain"[203]. A quarter of a century later Sircar was a bitter man. The Association's annual meeting on 4 September 1902 was Sircar's last. Addressing it he lamented : "I do not know how

to account for this apathy of our people towards the cultivation of science. And therefore I am forced to confess that I made a mistake in starting the project of founding a Science Association at all, and that I have wasted a life, as I have told you, in attempting to make it a national institution. If I had rigorously applied myself to the practice of my profession, though homeopathic, I am sure I could have left as a legacy an amount of money equal to that I have succeeded in collecting in over thirty years"[204].

Responding, *New India* editorialized on 11 September 1902 : "We cannot ignore the sad fact that while on the one hand, the Science Association stands as a memorial to Dr. Sircar's energy and his profound love for his own country and own people, it is a disgraceful commentary on our national character on the other. As long as the Viceroys and Lieutenant-Governors openly supported this movement, money came from all quarters to its funds, but with the practical withdrawal of official patronage, the purse strings of the wealthy public tightened at once, which not even the magic of Queen Victoria's name could reopen"[205]. The reference here is to Sircar's unsuccessful proposal for instituting a new professorship in the name of Queen Victoria on her death in 1901, as noted above.

Sircar's address elicited an editorial from Bombay-based *Voice of India* edited by Dadabhai Naoroji. It was probably he himself who wrote on 27 September 1902[206]. "So my good friend Dr. Mahendra Lal Sircar has grown despondent... But from whom did the promoters expect substantial aid for the Association? From a short-sighted and a slovenly foreign Government? Or, from an apathetic and besotted aristocracy in the land? Or, from an illiterate and half-starved peasantry? The educated progressive class in the country ought to have been their main support – the professional, commercial, industrial aristocrats of India those have made their fortunes through, and who have been able to enjoy them under, a settled rule. Has this particular class been duly reached by Dr. Sircar? I should like him to make one supreme effort in this direction; if he succeeds, he may yet shame the authorities into recognizing the claims of the Association in an adequate measure".

Anyway Sircar was now too old and tired to make another effort. In retrospect it is not surprising that the Association did not quite succeed in enthusing the intelligentsia about science. In 1890 Sircar wrote a letter to Dr. Sambhu Chandra Mookerjee[207], an influential editor : "if you have a real affection for me, as I fully believe you have, I must ask you to help forward with your powerful pen the cause of the dearest object of my life?"[208] Interestingly 15 years previously Sambhu Chandra had pleaded against Sircar's scheme and in favour of the Lieutenant-Governor's. In Sircar's time the well-heeled in Bengal owed nothing to science and did not need it. Science Association was not seen as a societal need but was tolerated as a personal fad of a prominent citizen who was in the good books of the high-ups.

In one important respect Rajendralala Mitra had been right. If the Science Association had focused on the laboratory rather than the lecture theatre, modern

scientific research might have taken roots in India in the 1880s itself. Sircar bitterly complained about the failure of the native community to shell out enough funds for instituting professorships. May be in the first flush of excitement he spent the collected money on buildings hoping that the inflow would continue. His hopes were badly belied. The upper classes were ready to financially support Sircar in his pursuits because he was one of them. But they were not ready to give money for creating employment for others. One wonders why Sircar did not become a researcher himself. He was eminently qualified to do so. His Association was well equipped with the state-of-art instruments from Europe. He could easily have become a discoverer. But he preferred to be a high-profile demonstrator. The high point of Sircar's social life was an invitation from the Viceroy to display the spectacle of the newly invented Crookes tube[209]. It was a toy for India but a research tool in Europe. As already noted it was later used to discover the electron. In 1897 Father Lafont assisted by a Tagore boy (Maharaja Jotindro Mohan Tagore's son Pradyot Kumar) took the X-ray image of the Viceroy Lord Elgin's s hand decorated with a ring and won a photography prize for the effort[210]. It is also noteworthy that Calcutta did not produce a Raman of its own not in the sense of a Nobel laureate but as a part-time researcher[211].

Science Association however succeeded in introducing the Bengali youth to the attractiveness of science as a career option in preference to public service or law. One is inclined to agree with the assessment offered by Sircar at the 1899 annual meeting. He was broadly justified in claiming that he had made "a beginning at a time when even the very name of science was scarcely heard of in this country, and when even the very rudiments of it were not taught in any educational institution except the Presidency College [Calcutta], where there were a few scientific instruments not for use but for misuse and disuse. It is not too much to say that it was mainly through the influence of the founders of the Science Association that examinations in scientific subjects were gradually introduced for the conferring of University degrees"[212].

India may have begun its flirtation with the modern science in the last quarter of the 19th century itself but it was not yet ready for a serious affair. The empire was still in full glory. A nod from the Viceroy's provide more excitement than any thing in the laboratory could. When on the morning of 8 February 1899 a letter arrived from the office of the private secretary of the Viceroy, Sircar opened it with "palpitating heart" and "was gratified to find that the Viceroy has accepted the office of the Patron of the Science Association". Sircar immediately wrote to the leading newspapers "to announce the Viceroy's acceptance"[213]. The empire lost much of its shine in the early 20th century when an Asian Japan defeated European Russia; Bengal partition was bitterly opposed and got cancelled; and Indian soldiers fought as equals in the first world war which in effect was a European civil war. Pursuit of science by the Indians became an extension of the nationalist movement even though British recognition was still sought and flaunted.

Government of India instituted competitive Gilchrist scholarships to send two candidates every year to UK for higher studies in science, law and literature. The first examination was held in January 1869. Although the scholarships were available to all the three Presidencies it was only Bengal candidates who opted for science. Aghor Nath Chattopadhyaya (1850-1915) became India's first Ph D. in Chemistry, but unfortunately did not pursue research (He was Sarojini Naidu's father). Two other Gilchrist scholars had a bright career; the geologist Pramatha Nath Bose (sent 1874) who advised the Tatas on iron ore for their Jamshedpur steel plant; and Prafulla Chandra Ray (sent 1882). To this must be added the name of the physicist J C Bose who went to England for science education on his parents' money.

Since Bose and Ray are India's first mainstream modern scientists, they deserve to be noted in some detail especially because both began their research career in the closing years of the 19th century itself. Both had been trained abroad and were colleagues (with Bose in the "European" grade; see below). Both had idealist fathers who ran into heavy debts which the sons dutifully cleared. But there the similarity ends. Bose's researches were more original, but his impact was more psychological than real. Though Ray's personal contribution to science is not of the same order as Bose's, his role in institution building in the academe and industry has been far more influential.

Science at Presidency College: J C Bose and P C Ray

Jagadis Bose was the first tangible and dramatic proof that the natives of a slave country could be the equals of their European masters. His appeal and message went beyond the science that made him famous[214]. Bose passed his B A in 1880 from St Xavier's College, Calcutta where he was a favourite student of Father Lafont's. Notwithstanding Lafont's inspired science teaching Bose left to himself would have sat for the ICS examination but his father though a deputy magistrate himself was dead set against it. Accordingly Bose was sent to London University on family expense to study medicine. After a year, in 1881, for reasons of health he transferred to Cambridge where Christ College offered him a scholarship, arranged by Ananda Mohan Bose (1847-1906) who was a former student of the college and married to Jagadis' elder sister. One of Jagadis's teachers in Cambridge was Lord Rayleigh who remained his life-long well-wisher. Jagadis passed the natural science Tripos examination in 1884. At "about the same time" and "without further work" he obtained BSc degree from London University[215]. Returning home in 1885 he was appointed a professor in Presidency College, Calcutta in the superior grade, otherwise reserved for Europeans, on personal intervention by Lord Ripon and to the great annoyance of his immediate superiors (It was once again the influential brother-in-law Ananda Mohan Bose who came to help, by arranging access to Ripon).

After nine years of rather uneventful professional life Bose turned researcher.

Electric waves (since known as radio waves) were discovered by Heinrich Rudolf Hertz (1857-1894) in 1888. At the time of his death on 1 January 1894, a leading expert on these waves was Oliver Lodge who had improvised a detector which he called coherer. In June 1894 he was invited by the Royal Institution to give a memorial lecture on "the Work of Hertz". Lodge took this opportunity to talk about his own work. Lodge's lecture was summarized in *Nature.* It was also serialized in successive issues of *The Electrician.* The lecture text was then expanded and published as a short book. Lodge "provided very simple and precise instructions whereby such detectors could readily be duplicated, even by unskilled hands". It succeeded "in disseminating an understanding of the properties of Hertzian waves beyond the small circle of mathematical physicists to whom the subject had appealed hitherto"[216]. There can be no doubt that it was Lodge's lecture, probably in the book form[217], that introduced Bose to the exciting new world of radio waves. The results that Bose obtained were quick, spectacular and beyond his own wildest imagination.

Bose presented his first results at the Asiatic Society which published them in the May 1895 issue of its *Journal.* According to his colleague Ray "It appears that he had not then realized the importance of the new line of research he had hit upon". Bose sent a reprint to Rayleigh who immediately saw its worth and got it republished in *The Electrician*[218]. Thus encouraged Bose launched into a phase of inspired activity that lasted only a handful of years but produced a substantial body of well recognized work on the optical properties of radio waves. Bose's innovation was at two levels. He worked with waves of extremely short wavelengths. For this "he had to invent a large number of new apparatus and instruments", all "distinguished by simplicity, directness, and ingenuity"[219]. In 1896 when Bose went to England on a lecture-demonstration tour he took with him electric apparatus "made with such help as Calcutta could afford". He got a duplicate made by the best firm of instrument makers in London which "expressed a wish to make copies of the same instruments for supply in the laboratories of Europe and America"[220]. Bose's second innovation was more fundamental. Europe was happy to work with metal to make radio detectors. But since metal rusts in the damp climate of Bengal, Bose experimented with a whole new class of "natural substances" including even jute. His work on galena was especially of great intrinsic value to the world of science.

The appreciation that Bose got in Europe enthused India. Rabindranath Tagore whose own world fame was still in the future wrote to Bose in England on 17 September 1900 : "We need not understand what you have achieved... we shall simply help ourselves to all the credit when *The Times* publishes words of praise from the lips of Englishmen"[221] Continuing in the same vein Tagore wrote to Bose 4 June 1901 : "I bow my heart at the feet of the God who has chosen you as the instrument of removal of India's shame"[222]. Those indeed were the days when God operated through the West. In 1901 itself Tagore wrote a poem in Bengali, titled *To Jagadishchandra Bose,*

which dramatically opened with the lines : "Young image of what old Rishi of Ind/Art thou, O Arya savant, Jagadis?[223]

In 1901, Dr. Alexander Muirhead (1848-1920), like Bose a doctorate in science from London University and a manufacturer of telegraphic equipment, met Bose in London and suggested that Bose patent his discoveries and share profits with Muirhead. Bose rejected the suggestion outright and with contempt. The same year a patent was filed in USA in Bose's name, assigning half of the royalty to Sara Chapman Bull, better known as Mrs. Ole Bull after her Norwegian husband[224]. But a stubborn Bose refused to encash it. Bose had no objection to accepting industrial money from the West (that is Mrs. Bull) but would not generate it himself. There is an irony that has often been missed. Bose though a physics professor in a college was still a product of an orientalized East; accordingly he was repelled by the idea of making money from his inventions. On the other hand Sister Nivedita (born Margaret Noble 1867-1911) though a spiritual person was still a child of western industrial culture; she was all for patents and royalties. In fact in her enthusiasm for creating an aura around Bose she went overboard. In a 1903 letter to Rabindranath Tagore she wrongly declared Bose to be "the discoverer of the Etheric waves that penetrate minerals". She also referred to the prevalence of "a strong race-feeling of jealousy to combine with the natural and scientific opposition"[225]. Inspired by this, there have been some half-hearted attempts recent times to project Bose as a victim of colonialism. This is unfair. First of all, for his employment no less than the Viceroy personally intervened. The radio Bose received due encouragement and recognition from the West. He was even offered a "new professorship in a renowned university[226]. Admittedly later western historians have tended to obliterate his name[227]. The criticism of the West would have been justified if Bose had been in competition for the prize and had been deliberately sidelined. Given a choice Bose would probably have opted for mainstream recognition of his plant research rather than a Nobel prize in physics. A 100 years after Bose, India seems to have come to the painful realization that it is unlikely to make any worthwhile scientific inventions any more. It has therefore decided to invent a Bose that did not exist before[228] (Kochhar 1998).

If Bose had indeed taken out patents the history of Indian science and industry might have been different. As Ray reminded his audience on the occasion of Bose's knighthood (1916) Bose would have made millions for himself as royalty. Even more importantly he would have become a role model for production of wealth through science. But at the time India was looking for a counter-example and not a role model. As it is Bose abandoned radio physics altogether and there were no trained students to continue his line of research. Thus in spite of Bose's epoch making researches technical physics could not be institutionalized in India. Bose's career as an internationally recognized pioneering scientist ended with the closure of the 19th century. The remaining years of his working life he spent in investigating topics such as responses

in the living and the non-living. At the time this work was considered to be pseudo-science. Bose could not get it published in any western journal and had to publish it himself. It was in fact seen as an embarrassment and delayed his election to the Royal Society (till 1920).

In India the Western recognition Bose had won for his radio work was transferred to his later investigations. In the 1950s when we were in school in Himachal Pradesh we were told this story about Bose, which we discovered later, was extant throughout the country. Sir J C Bose is in England on a lecture tour where he sets out to experimentally demonstrate how the plants respond to external stimuli the same way as humans do. To make his point, he sprinkles a poisonous substance on the plant but nothing happens. The audience bursts into ridiculing laughter. Touched to the quick Bose swallows the substance himself. Nothing happens to him either. The hall is momentarily stunned into silence and then bursts into thunderous applause. Somebody (an Englishman?) had maliciously replaced the real poison with a harmless powder to spite Bose but the great Indian scientist gets the better of him. I have advisedly narrated the story in the present tense because it is apocryphal. Still, it is significant because it tells us that Bose's international stature was part of national consciousness. However in his own country he was perceived as an original modern thinker/researcher on issues that jelled with ancient Indian philosophy rather than as a part of the European science machine to which he owed his name and fame.

Creativity wise P C Ray's 1895 discovery of mercurous nitrite though immediately hailed in the West[229] was not in the same league as Bose's radio work. Ray's personal researches however remained sustained and focused. Thanks to his well-rounded personality and an institutional laboratory at his disposal he went on to found an internationally recognized school of chemistry. A pupil of his, Atul Chandra Ghosh, who taught at the far-off Dyal Singh College, Lahore had as his student the well-known industrial chemist and the first Director-General of Council of Scientific and Industrial Research, Shanti Swarup Bhatnagar (1894-1955)[230].

The first ever paper Ray published, in 1894, on return from Edinburgh dealt with the problem of adulteration of ghee (clarified butter) and mustard oil used as cooking medium[231]. Even before he embarked on his theoretical researches he started manufacturing and marketing chemicals and drugs. He successfully produced phosphate of soda from animal bones which were available in plenty, much to the chagrin of his neighbours and suspicion of the policeman. He then graduated to making various syrups and tinctures according to the British Pharmacopoeia specifications[232]. In 1892 or early 1893 he set up a private firm with the long but descriptive name Bengal Chemical and Pharmaceutical Works[233]. As Ray recalled in 1940, in setting up the works he "had not only the idea of wiping out the reproach that the Bengalees were good for nothing in business affairs, but also of making it a model institution"[234]. The firm was made into a limited liability company in 1901 and placed on a firm footing

by the first world war[235]. To Ray and others goes the credit for the successful mainstreaming of traditional Indian health-care. "At the Indian Medical Congress held in Calcutta in 1898 we had a stall in which we exhibited preparations of Indian drugs and these attracted considerable attention of the medical men gathered from different parts of India. A strong representation was made by the Council of the Congress at the instance, I believe, of Kanai Lai Dey, who was then almost on the verge of his grave, urging the official recognition of some of these drugs and the British Pharmacopoeia authorities were at last prevailed upon to find a back seat for them in the Addendum"[236].

In distant Bombay, in September 1898, the Parsee industrialist and philanthropist Jamsetji Nusserwanji Tata (1839-1904) made a spectacular gesture in the cause of science education. He publicly offered to donate half of his wealth, comprising fourteen of his buildings and four landed properties in Bombay, towards the establishment of a science university. The donation was estimated to be worth about 30 lakh rupees at the time[237]. He even enlisted the support of Swami Vivekananda for the scheme[238]. Ray for one was not impressed. In 1899 he declared bluntly that the proposed institute "would be waste of money and a diversion, and misapplication of energies". Ray felt that "It would be more conducive to the cause of science in India if the existing institutions in the different parts of India...were utilized to the fullest extent[239]. Sircar on his part could not help comparing Tata's scheme with his own. The objects of both, he felt, were the same, namely, "to fit and enable the natives of India to carry out scientific investigation for the discovery of new truths". And yet, "while the ways and means proposed by Mr. Tata for carrying out that object are too extravagant for even imperial resources, the ways and means proposed by the founders of the Science Association are reasonably economical and quite within the resources of the people themselves, if they would mind contributing each according to his capacity"[240]. Finally, a decade after Jamsetji's endowment offer, Indian Institute of Science, Bangalore was formally established in 1909 as "a tripartite venture" of the Tatas, the Government of India and of Mysore (now Karnataka)[241]. The first students were admitted in July 1911. The success that later came to attend the Indian Institute of Science could not have been anticipated in its early years.

The year Sircar died (1904) saw the passage of the Indian Universities Act on an initiative by the otherwise unpopular Viceroy Lord Curzon. If Sircar had lived a few more years he would have been a witness to the spectacular transformation of Calcutta University from a purely examining body into a post-graduate teaching and research centre brought, about by Asutosh Mookerjee.

During the later British period scientific activity in the universities was seen as a nationalist statement. However independent India very unwisely decided to jettison the universities for the sake of national laboratories. Still in the decades immediately following independence science was seen as an instrument of nation building. Not any more. Globalization has transformed India economy as well as the Indian middle class.

India's economic growth is being driven by the services sector, which is manifestly science-less. If the economy of a country becomes derivative so will its culture. Science cannot flourish in a society whose economy does not require science. If the Indian economy has disowned science the middle class has disowned India itself. Globalization has introduced upper India to a consumerist lifestyle that is beyond the intrinsic strength of India economy. This lifestyle can only be maintained by servicing the Western economy.

West Bengal is the solitary exception to this broad national pattern. It is my assessment that as the lure of servicing world markets sucks in more and more young men and women through out India West Bengal students will probably be the only ones left to pursue basic science. That is the real legacy of Dr. Mahendra Lal Sircar and his Science Association.

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Appendix I

On the desirability of a national institution for the cultivation of the sciences by the natives of India. By Mahendra Lal Sircar, MD (Pamphlet printed at Anglo-Sanskrit Press, Calcutta, known to be published 20 December 1869).

In the July number of the *Quarterly Journal of Science* there is an able essay by Dr. Lankester, a most eloquent appeal for the introduction of the teaching of natural science in the schools of Great Britain. We could hardly conceive such a state of things as described there to exist in enlightened England. We could hardly believe that England with all her boasted civilization was actually behind the other European Nations in a matter which pre-eminently distinguishes the civilization of modern days. But what after all, it may be asked, is civilization? Definitions are certainly the most difficult things in the world, and the definition of civilization is difficult *par excellence.* Without however venturing to define what civilization is, we may confidently say what it is not, and what it is incompatible with. Our ideal of civilization is incompatible with arbitrary restrictions upon the liberty of thought and private judgment and with prejudice of every description. And it matters not whether the restrictions come from the legislature or from public opinion, and whether the prejudice exists among priests or among men of science. If judged by this standard o European country can be said to be civilized, we cannot help the inference. Absolute toleration of all opinions should mark civilization properly so called. Until men should learn to respect each other's honest convictions, and until they should be free from all prejudice, in other words, be

fearless of the consequences of discoveries in the fields of knowledge, they cannot be said to have become civilized men, men true to their own natures.

The one thing which can secure this blessing to mankind, this toleration, this freedom from prejudice, is knowledge. The more we know, the more we know that we do not know; – in the impressive language of the late Dr. Chalmers, the more the sphere of light, representing positive knowledge, is enlarged, the more the circumference, that divides the light from the darkness beyond, becomes necessarily enlarged. The oracle of Delphi pronounced Socrates to be the wisest man in Greece, because he alone was fully aware of his own ignorance. A legitimate interference from this knowledge of our ignorance is that others may know what *we* do not know. And the moment the mind comes to this normal condition the conviction will be forced upon it that it is illogical, and therefore unphilosophical, nay sinful, to pre-judge, or *à priori,* and far more to condemn, opinions honestly put forth by other minds.

The kind of knowledge which is best calculated to remove prejudice and the spirit of intolerance from the mind, is what passes by the name of the Physical Sciences. And the reason of this lies in the fact that in the pursuit of these studies there is little room for dogmatism. We are certainly at liberty to advance opinions and hypotheses, and opinions and hypotheses, so long as they are suggestive, have their value in scientific researches, but we have no right to urge them as facts until they have been verified; so that whoever questions their correspondence with nature can at any moment satisfy himself by observation and experiment.

The world is yet being largely governed by the despotism of traditional opinions, opinions which have come down from the darkest ages, and which are still pertinaciously held by men who are no better than idlers, and who trifle with God's truth and with God's great gifts to man – his powers of observation and reasoning. These opinions are held not only concerning morals and religion about which the widest latitude still prevails, and may be allowed to prevail, but strange to say, concerning the material universe also, about which, among those who will but open their eyes, there ought not to be any difference whatever. The world is flat, the world is the centre around which the heavenly bodies perform their daily revolutions, man has been created only six thousand years ago – these and such opinions as these are still held as veritable truths, to disbelieve which is to risk even one's salvation. With such ignorance will some men domineer over their fellow-men, and exact implicit obedience to their dicta. This, to say the least, is a mistake. It turns men from the precious truths with which these fables are unfortunately associated in the ancient records.

But nowhere is this despotism of traditional opinions more severely felt than in this country. The Hindu religion, besides having in a pre-eminent degree the grand characteristic of all religion, which is to divorce the mind from the works of God, has besides become, through the corruptions of successive ages, a heterogeneous medley of theology, philosophy, science, and what not, – in other words, a chaotic mass of

crude and undigested and unfounded opinions on all subjects, enunciated and enforced in the most dogmatic way imaginable. The Hindu mind, thanks to this religion which has been swaying it for centuries without number, and thanks no less to its other surroundings, has lost much of its original Aryan vigor and energy, and has become more of a speculative than of a practical character, singularly deficient in patient industry to observe and collect materials, too prone to hasty generalizations, depending more upon its own inspirations than upon outward facts. Thus altogether, though highly endowed, it has been little productive of results.

India is, properly speaking, Hindustan – the land of the Hindus; for though apparently and perhaps ethnologically she is peopled by a variety of races, the tie of religion has made them all into one family. The British Nation, in its possession of India, has indeed a most solemn trust, – the regeneration of a vast dependency, of the once glorious Hindu nation; the awakening to life and liberty upwards of one hundred and eighty millions of souls, down-trodden for centuries by foreign yoke and a most de-energizing religion. It must be acknowledged with gratitude that England, despite all shortcomings inseparable from a foreign rule, is doing her duty right royally. She has become aware that her true glory should consist not in simply holding under subjection the people of India, but in elevating them in the scale of nations, in taking them by the hand and reconciling them to their long-alienated brethren, her own children.

But while the British Nation has a duty to perform towards us, it must not be forgotten that we have a no less solemn and sacred duty towards ourselves, imperative alike by gratitude for the unspeakable benefits we have received under British rule, and by patriotic feeling for the land to which we have the honour and the pride to belong. It is true that born in India we have inherited submission to a foreign yoke, but it must be our consolation that we have inherited a mind not inferior in its endowments to the mind of any nation on earth. Through adventitious circumstances that mind has indeed lost much of its vigor and activity, yet it has already given promise that it is capable of as much activity and vigor as any in the world. Thorough regeneration of the people of India will, of course, be the work of time and of favourable circumstances, but it is in our own hands, if we will but have it.

Of these favourable circumstances the most efficient is SELF-RELIANCE. This we have not yet learned. For any move tending to our own prosperity we expect always to be helped by Government. If the Government were to do every thing for us, we shall never do any thing for ourselves. We must be weaned from this sort of dependence upon others, just as a baby is weaned from the mother's breast. It should be our earnest endeavour to back the efforts of Government to do good to ourselves.

It is impossible to say whether the day shall ever come when we shall be able (we do not say allowed) to take the reins of the government of our country in our own hands. But this is certain, and we cannot be too grateful for it, that we are gradually getting more and more share in it, that every day almost, thanks to the current of

inherent generosity that flows through every British heart, some obstacle or other is being removed, that stood in the way of our being recognized as brethren, though now fallen and degraded. And when all these obstacles will be removed we do not see in what respects politically will a native of India differ from a native of England.

We believe a day will come for the world when the present forms of Government will cease, when in fact, the superstition attached to them will be incompatible with the progress of the times. But for the present we should deem ourselves fortunate indeed, if we enjoy the same liberty of thought and action as any Englishman does. This would be enjoying more liberty in fact than a Hindu ever did in his own golden ages. Nothing in our opinion could be greater tyranny than the monopolizing of learning by one section or caste of the community, which prevailed in India even in the most ancient times. Let us thank Heaven then, that though nominally under a foreign power, that foreign power is really more friendly towards us, than what we could call our own ever was; that we live in better days, when we have fuller opportunities of developing the ends of our being, of fulfilling our destiny.

The best method, and under the present circumstances, the only method, that we can conceive of, by which the people of India can be essentially improved, by which the Hindu mind can be developed to its full proportions, is, as we have seen above, by the cultivation of the Physical Sciences. The great defects, inherent and acquired, which we have pointed out as characteristics of the Hindu mind in general of the present day, can only be remedied by the training which results from investigation of natural phenomena. The despotism of a religion, debasing in all its present phases, and of time-honored customs, which, whatever their original philosophy, have become mischievous in the extreme, can only be shaken to its foundations by the irresistible force of recoil which the mind will acquire, when fed upon the substantial nourishment of pure truths as presented direct by the handiworks of God.

In order that these truths may exet their full influence, we should not only present them to the mind, but it is necessary also that the mind should be so trained that with patience and diligence it may discover them for itself. It is thus only that the Hindu mind will be in a position to shake off its inherent indolence and apathy and to appreciate the laws of nature or the workings of the Divine Mind.

This training of the mind is a most difficult part of education, and can only be conducted either in school and colleges, or by public lectures. In a recent number of the *Calcutta Journal of Medicine,* while speaking of the preliminary education of candidates for the medical profession, we took occasion to point out the laxity of our University rules regarding the teaching of natural science in our educational institutions. It may be some consolation, though a very poor one indeed, that similar institutions in England do not fare much better. To compensate, however, for this deficiency, there are, in England, public institutions where experimental lectures are delivered by the eminent cultivators of science. Here, on the contrary, there is nothing of the kind. The

only scientific Institution of any respectability in all India is the Asiatic Society of Bengal. It has done and is doing much for the advancement of science in this country. But it does not present to humble learners any facilities for the pursuit of scientific studies. Nor is it necessary or desirable that it should. It is well that with its higher pretensions it should engage itself in new field of research.

We want a different Institution altogether. We want an institution which will combine the characters, the scope and objects, of the Royal Institution in London and of the British Association for the Advancement of Science. We want an institution which shall be for the instruction of the masses, where lectures on scientific subjects will be systematically delivered, and not only illustrative experiments performed by the lecturers, but the audience should be invited and taught to perform them themselves. And we wish that this Institution be entirely under native management and control. We say this not out of vanity but simply that we may begin to learn the value of self-reliance in matters in which we may do it without any serious risk.

Nor do we think this to be absolutely impossible. The question is not one of capability but of feasibility. We are confident on the score of intellectual capability to carry on the thing when fairly set agoing. As to its feasibility it depends upon one condition – Money. With sufficient funds to meet the expenditure, we are almost sanguine that not only will the project be carried out, but carried out most creditably. And ought we to shrink from this noble duty for want of pecuniary resources? We hear there were Rajahs and noblemen of olden days, not much older than our own, who were liberal to the extent of spending lacs of money in the marriages of pet dogs and cats. And we hear of a Rajah even in our own time, who is said to have spent thousands for the burial of a dog. We must say we are sincerely glad at this, inasmuch as it indicates a spirit of liberality in the individuals who have so signalized themselves. We are only sorry that liberality did not take a more healthy direction, but we are almost sure that it was owing purely to want of knowledge, knowledge of the uses to which money might be turned. May we not hope there are Rajahs and noblemen who have known better uses of the immense wealth so many of them possess? May we not hope that they will be wiling, if only they are informed, to spend a fraction of their wealth for such a glorious purpose as the amelioration, nay regeneration of their own country, when their ancestors could spend so liberally on such ignoble and ridiculous occasions as the marriages and burials of dogs and cats? From one illustrious example we have much ground of hope. It will no doubt give our readers and all genuine well-wishers of our country sincere pleasure to learn that in the person of His Highness, the Maharajah of Khettree, we have a prince who has intelligence to appreciate the benefits that are derivable from the cultivation of science, and who has true patriotic enthusiasm to see those benefits availed of by his countrymen. Are we to suppose there are none amongst our Rajahs and Princes to imitate his bright and noble example?

While we thus invoke aid from our own countrymen it must not be supposed that we look for aid from no other quarter. We look for aid from all quarters, and especially from the English community. To the latter, we doubt not, it will be gratifying to see that we have at last learnt to beg for such noble purposes, which we must gratefully set to the credit of their own example. May we not hope that the advent of His Royal Highness, the Duke of Edinburgh, – a Prince born of a mother, perhaps the most beloved of crowned heads that ever graced a throne, because her heart is dedicated to the good of humanity, and of a father whose mind and soul were animated by an enthusiastic devotion to the cause of science which is synonymous with the cause of humanity – may we not hope that the advent of such a Prince in India will be marked by an epoch in the history of the country? And what can Prince Alfred do better in and for India, the richest jewel, as it has been truly called, in the diadem of her Gracious Majesty, our beloved Queen, than following in the footsteps of his noble Father exert his exalted influence to lay the foundation here of the Temple of Positive Science?

Appendix II

Prefaces written by Dr. Mahendra Lal Sircar 1872-1880 to a serial anthology titled Indian Association for the Cultivation of Science, printed at Anglo-Sanskrit Press, Calcutta.

PREFACE OF 1872

The following Essays on a Science Association for my countrymen, with the opinions of the Press thereon, are published with a view to re-awaken attention on a question of vital importance to us natives of India. I have deemed the question opened in the following pages so important, inasmuch as on its practical solution depends in a great measure, in my humble, opinion, the future of my great but unfortunate country, – depends in a word, the final solution of the other question, namely, whether the natives of India, with their admitted and justly boasted intelligence, and their capacity for development and progress, are ever to take part in the intellectual history of the world, or for lack of proper culture, are to be blotted out of such existence, as they have well-nigh begun to be.

To the Press of India which have hitherto supported me so nobly, and to my countrymen who have begun to mark their appreciation of my project in such a practical way, I again commend this my feeble appeal in its behalf, and trust that I am not altogether mistaken to think that through their further advocacy and patronage, it will ere long become an accomplished fact.

Calcutta, March 1872 M.L.S.

PREFACE OF 1875

The following pamphlet, which I now beg to lay before the public, contains the essays that I have published, and the results of the humble exertions that I have made, since 1869, to invite attention to the great necessity that exists of founding by indigenous effort a National Institution for the cultivation of science by my countrymen. I have given in the *appendix* the opinions which the Press of India have expressed from time to time as occasion required. I have thus attempted to present to the public a sort of history of the Project, from which it will be seen that at the second meeting of my subscribers, held on the 20th ultimo, a body of Trustees was appointed to act as custodians of the subscriptions to be realised, and also a Provisional Committee to draw up a plan of organization of the Association. The Provisional Committee met on the 16th instant, and, after discussing the Scheme I submitted to them, adopted a Report in which they recommended "the establishment of the Association, particularly at this auspicious time of the visit of HRH the Prince of Wales, inasmuch as we believe (they said), it would be a most fitting memorial of that visit, towards which all alike, Native and European, high and low, ought to contribute, whereby they will be showing their loyalty in a two fold aspect, loyalty to their sovereign and loyalty to enlightened progress". They added, that "the Institution, while it will be the most fitting memorial of the Prince that can be conceived, will gradually fulfill the mission of England to India, the restoration and elevation of the people of India".

I was about to take steps to endeavour to carry the recommendations of the Provisional Committee into effect, when I was prostrated by sickness, and thus prevented from moving about and working. But it is a matter of sincere rejoicing to me to see that the two-fold loyalty spoken of above has found expression in another quarter, a quarter too occupied by one who for a long time has been occupying a place in my affections. I do not stop here to examine the claims of precedence as regards time. I do not claim the credit of having originated the project so long as six years ago. I do not insist upon the fact that the ground was prepared by me for even the accident of success of the new move. I waive all claims to originality in a matter of such vast importance to the intellectual life of the nation. If I could lay bare my heart I could have shown that I am rejoicing as much as if I had originated the new movement. I am sorry, however, to find it being insinuated in quarters from which-I least expected it, that I have become jealous of the fresh efforts that are being made in the cause of science, and that influenced by this evil spirit of jealousy I am opposed to the amalgamation proposed by Sir Richard Temple.

But is it fair that I should be abused and misrepresented without an examination of the facts of the case? The new movement, having been made without any reference to me, must be looked upon as distinct from mine, at least I have no right to regard it but in that light. The question to decide, therefore, before an amalgamation is to be thought of, is – Are the objects of the two movements identical? For if they are, why

talk of amalgamation, there must needs be coalescence. If it is the same bantling that I have been hitherto nursing, I will certainly not allow it to be cut in twain, to enjoy the pleasure of depriving another of a share in the credit of having given it birth. The object is so vast, the fund required to carry it out is so large in proportion, that at this stage division would be death. If the objects are not identical, then we shall have to see, if being distinct they can be promoted by the same institution. For if such be the case, then amalgamation would certainly be most desirable and ought to be brought about. But if so distinct that they cannot be made to run parallel to each other, then there would be no earthly utility of an amalgamation, on the contrary, a forced amalgamation might not only be disagreeable but injurious to both. How and who to decide these questions? My project is before the public ever since 1869, and to make it appear less vague, and more intelligible, if not more popular, than it hitherto was, I publish the scheme of operations, which I submitted to the Provisional Committee on the 16th instant, and upon which their Report was founded. The originators of the new movement have not yet published any scheme, at least, anything like a definite one. In all fairness, therefore, the onus of the decision must rest with them.

I cannot conclude without noticing a singular coincidence. The project was launched before the public at the time when HPH the Duke of Edinburgh favoured us with a visit. The project has been making slow but steady progress since, and is about to be an accomplished fact when HRH the Prince of Wales, India's future Emperor, has set foot on he classic soil. I had invoked patronage of HRH the Duke, but at the time the Project had not enlisted sufficient sympathy amongst my countrymen to be worthy of such distinguished favour. It may certainly now be said to have commanded universal approval, and secured the sympathy and support of the educated intelligence of the country. May I hope that, however unworthy the projector, the project may be deemed, from the objects aimed at, worthy of Royal Patronage. May I hope that the Prince, in whose veins runs the best blood of the most intellectual nations of Europe, will lend a helping hand in laying the foundation of an institution which will be a pledge as it were of England's good wishes to India, and serve as a lasting monument to remind India's children of the debt immense of endless gratitude they owe for their intellectual and moral revivification to England's noble sons.

Calcutta M.L.S.

The 30th December 1875

PREFACE OF 1877

The Scheme of the Science Association has happily survived the battle of Theory and Practice.

In a country which had to establish a Science Association, avowedly without scientific men, and, indeed, with the express object of rearing such men, the battle

was perhaps a fight about shadows, resulting from a too easy and light view, taken by one of the contending parties, of the requirements of technical education.

I was not judged quite correctly when I was supposed to advocate the cultivation of science in the abstract, in preference to the inculcation of its practical applications.

There was a misconception in the signification of terms in this matter which I attempted to remove by pointing out that science, to be taught effectually, must be taught experimentally, that is practically, and that the varied applications to the arts and comforts of life, which have flowed from a knowledge of its principles or facts, form part of the body of science, and must be taught to illustrate the principles themselves.

These illustrations must necessarily be on a small scale to suit the class-room and the laboratory, but it will be enough to impress the principles upon the mind, so that when it has to work them out in the concerns and affairs of life, it will have well-arranged knowledge to guide it, and serve it in unlooked-for emergencies.

This is the aim and object of my institution, and I must admit, as I did admit, is different from technical education strictly so called.

I was supposed to denounce such education as mean, or at least, as unnecessary. I could not do so, without throttling my own scheme. I could not forget that an institute of science would lose half its value, if it had no practical bearing, if it could not give a scientific direction to industry and the arts, – if, in a word, it could not help the cause of technical education.

What I contend for still is, that technical education cannot be properly, efficiently, and permanently carried on by indigenous efforts, without a previous supply of indigenous scientific teachers. According to Scott Russell, the greatest advocate of technical education, a technical teacher should be a master of science and a master of skill.

Have we any such men here? The answer must be in every one's mouth. There is difficulty in procuring such men even in England. And, therefore, the same authority proposes "three ways, to conquer this difficulty :" –

"(i) We must resolutely search our own and foreign countries to find such men, and at any cost we must bring them into our universities." Considering that our country has no such men, one can easily see what the cost of procuring them from foreign countries must be. If the cost is forthcoming I would by al means encourage the importation, remembering, of course, that this is to serve a provisional purpose.

"(ii) The men whom we cannot find, we must make – in two ways. We must take a man of eminent science, and prevail on him to humble himself, and go study, in the workshop of their fathers, the trades and professions of the children we wish him to teach. Another is, to take a man already distinguished as the most eminent member of his profession, and prevail on him to qualify himself as the teacher of such science as leads to distinction in his business." The difficulty of this expedient in this

country cannot fail to be seen as insuperable. We have not here either men of eminent science, or men carrying on any great industrial profession to be distinguished therein. And even if we had men of this latter class, where were they to receive scientific education?

"(iii) Finally, we must at once set about providing the future supply of fit teachers by an organized system in our own university of training eminent men for technical professors". Mr. Russell's ideal university is on the model of the Polytechnic Institution of Switzerland and Prussia, the establishment of the like of which is hopeless here. But if we remember, that "science is the sole foundation of skill", we know how to "set about", that is, to make a right, though a small, beginning.

Thus, apart from all other considerations, we have in the very requirements of technical education, a powerful argument for the necessity of a pure science institution, where it would be well to leave the cultivators of science unhampered with thoughts of immediate practical utility. For as Helmholtz has wisely said, "whoever, in the pursuit of science, seeks after immediate practical utility, may generally rest assured that he will seek in vain". It is enough that "we are convinced that whatever contributes to the knowledge of the forces of nature or the powers of the human mind is worth cherishing, and may in its own due time, bear practical fruit, very often where we should least have expected it."

Thus the battle of Theory and Practice was, as I have said, and I believe, as I have conclusively shown, a fight about shadows. It was nevertheless a healthy sign for apathetic Bengal that a battle was fought, and with considerable earnestness and zeal on both sides. And it is no small satisfaction to me that my cherished project should have more than survived the contest.

With the aid already received from munificent donors, and with the unexpected aid from Government in the shape of a house in an excellent, centrically situated locality, the Science Association, as will be seen from the following pages, has passed from the stage of project, and has commenced operations though necessarily in a very humble way.

It is needless, however, to say that its development as an institution for scientific research and scientific education will depend upon, and, in fact, will be commensurate with, the funds will be able to command, and that the funds already realized from donations, although adequate only to give it a start, are far from adequate to help on that development.

If it is wished, and it is presumed that it must be the wish of every one who sincerely wishes good to this country, that the career of the Institution should be one of real progress, coincident with the progress of the sciences, the cultivation and consequent advancement of which are its aim and object, then we must see that it does not languish from want of support.

Babu Rajendralala Mitra did not exaggerate, but was literally within the bounds of sober truth, when addressing the Subscribers at their third Meeting, he said, that "to carry out the scheme effectually and completely in all its branches they wanted a lac for every thousand they had".

And this opinion of the worthy Doctor has been endorsed by all competent to judge in these matters.

In the present state of education in this country it is but natural, at least not unreasonable, that people should be anxious to test the soundness of any project, solicitous of such large, almost unlimited popular favour, by the view the enlightened government of the country takes of it; and they cannot be much blamed if they scruple to give any countenance to it unless they see the government taking an active interest in it.

Now, that Government has shown such appreciative sympathy for the Association, and vindicated the sincerity of its solicitude for the good of the people by such liberal aid to the Association, people themselves have no excuse to withhold *their* aid from an institution which is calculated to benefit them so immensely.

It is, therefore, confidently hoped that my countrymen will awake to the magnitude and importance of the scheme of the Science Association, and will come forward, each according to his means, to its aid.

It is thus only that my countrymen can best testify their gratitude to His Honor the Lieutenant-Governor, to whom not only Bengal, but all India is under deep obligation for the moral and material support he has rendered the Institution; which, indeed, without that support, could never have come into being. And I have no doubt that such expression of gratitude will be more acceptable to Sir Richard Temple than any other that can be conceived.

Today India enters on a new stage of her existence, which, we believe, the Providence of God has designed to be the prelude to her re-appearance on the stage of the world, as the land of bright intelligence, of exalted morality, and of universe-embracing religion.

Under the sheltering wings of a Power, which, though in the narrowest sense, is foreign, in the broadest sense is more our own, than any we could can our own, – under the protecting shadow of such a Power, which today formally guarantees us "the peaceful enjoyment of our own," I have no doubt the potential of these three characteristic endowments of the children of the once glorious Bharatvarasa will develop into the actual again, for the enlightenment and elevation of the human race.

My belief is, that it is in the Eternal Counsels that this will be so. But we have duties nevertheless. "We should pray", said Chalmers, "as if God did all; and we should work as if man did all", We must not forget that we are appointed humble instruments to carry out the designs of the Almighty, and if we fail to do so, we prove

ourselves unworthy of being the children of God, and must, in consequence, lose our birthright.

One of the means, and under the circumstances, the best means, whereby the regeneration of India can be effected, is, I cannot too often and too emphatically repeat the cultivation of science, and to this I once more invite my countrymen.

May I hope that the Noble Lord, who today cradles India on her new stage of existence, will feel interested in an Institution, which, though the humblest and indeed the only one of its kind in this part of the world, may under proper nursing and imperial encouragement have its highest aspirations fulfilled, namely, to enable the indigenous intellect, in noble rivalry with the intellect of the West, to assert its rightful sovereignty over the domains of Nature.

"The dignity of the commandment", said one of England's greatest philosophers, "is according to the dignity of the commanded", There cannot be a higher and nobler triumph for English statesmanship to achieve in India than to effect the intellectual and moral elevation of the people of India. For it is thus only that the brightest jewel in the imperial diadem of England can be made of shine brighter, and the dignity of English rule to acquire increased luster.

Calcutta, January 1st 1877 M.L.S.

PREFACE OF 1880

The *Hindoo Patriot* has very truly said, that "the Viceroy's visit to the Science Association not only marks an epoch in the history of that Institution but also in the annals of Indian education".

The founders and supporters of the Institution have now the best encouragement for their undertaking – they have the highest testimony of its importance – testimony which is all the more valuable, as it is perfectly disinterested and the most deeply appreciative that has yet been given. When Lord Lytton, from his lofty position as Viceroy of India and as a most distinguished man of letters, speaks of the Science Association as an institution, "which is destined, year by year, more and more, further and further, to carry through the length and breadth of India the ever-widening light of the great practical truths which belong to Science", well may its members take heart and go on, though it be "to work slowly, often obscurely in her cause".

But members must not forget that they have a twofold work to do for the Association. They must not think they have done all they could for it by having paid down their donations. For, princely and magnificent as these donations may be and have been in a great many instances, they must remember that their real work commences just when they identify themselves with the Association by paying down their contributions. They must endeavour to enlist, and should not rest satisfied till they have succeeded in enlisting, the sympathy and support of their neighbours and of all

whom they can reach in the same good cause.

Though the Institution has been started and is being yet almost exclusively supported by natives of Bengal, we must not forget that Bengal has not come forward to its aid adequately to her intelligence and wealth. This, I must admit, has been due not to any want of enlightened liberality on the part of our millionaires, but entirely to my own inability to render the aim and objects of the institution clear and intelligible. Under such circumstances it is providential that the Viceroy of India should have come to its rescue and expounded its objects, immediate and prospective, with such masterly and philosophic comprehensiveness and put forward its claims on the sympathy and support of the natives of this country with such ardour and earnestness of deep conviction, in language of such grandeur and force, that I am not sorry that I have myself been hitherto failing in my duty to a cause which by the merest accident has become associated with me.

After such exposition of its objects and such appeal in its behalf from such a personage, may I not confidently hope that my countrymen, not only of Bengal, but of all India, and of all classes, – peasant, zemindar, chiefs, and princes, – shall realize the noble and sacred importance of the Science Association, and come forward, each according to his means, to its aid, so as to render it a permanent institution of the land, which shall be a most worthy offspring of their awakened intelligence, remain for ages the most glorious monument of British rule, and rear its head in all time as the most acceptable temple which man can raise in honor of the Creator.

Calcutta MAHENDRA LAL SIRCAR

April 12, 1880

Appendix III

Rajendralala Mitra's letter dated 12 April 1882 to the Lieutenant-Governor sending his resignation as Vice-President of Science Association, published in The Statesman, Calcutta, 27 May 1882.

From RAI RAJENDRALALA MITTRA, Bahadoor, LLD, CLE, to the Honorable Sir ASHLEY EDEN, KCSI, CLE., President of the Indian Association for the Cultivation of Science, – dated Manictolah, Calcutta, the 12th April 1882.

HONORABLE SIR, – I beg leave to place in your hands my resignation of the office of Vice-President of the Indian Association for the Cultivation of Science.

I have taken this course, as I feel I cannot continue to hold the office with justice to myself and to the public before whom I have to appear as the Chairman of the Managing Committee of the Association.

When the Association was first established, I had hoped that it would soon be

in a position to redeem at least a part of its promises, but a few years' experience has convinced me that there is no prospect of that hope being realized within a reasonable time, and what has hitherto been done is by no means satisfactory.

The professed object of the Association is to help the practical cultivation of science by those who have already acquired the rudiments of science elsewhere, and of profoundly attaching them to their several branches of enquiry, in order to lay the foundation, among the higher classes of intellect, of an accomplished scientific character. As yet nothing has been done to realize this object.

The first requirement for the purpose is a staff of tutors; but the Association has not the means at hand to employ it. The lecturers who now work are unquestionable able men; but as they are volunteers, the Association cannot command or control their actions, and has as yet laid down no programme of the courses of tuition. The lecturers select their subject on each occasion according to their choice, and the result has been that some of the lectures have not been consecutive and progressive beyond the standard fixed for primary instruction in the Presidency College as they should have been, while others have been quite desultory. They may have been well calculated to teach isolated facts; but taken together, they cannot be called courses of systematic teaching.

In newspapers frequent announcements are made of a "practical class", and if a well organized class of this kind had been got up, it would have been of immense benefit. The microscope in the hand of the young botanist or physiologist; the goniometer or blowpipe in those of the mineralogical student; the various contrivances for reflecting, refracting, polarizing, and depolarizing light, and for the optical examinations of crystals; a well furnished laboratory for the working chemist, all such implements and appliances rendered easily and always accessible for instruction to willing learners under competent superintendence and advice, would be an acquisition the advantage of which could hardly be overrated. But as yet nothing worth naming has been done in this respect. The scholarship-holders (some eight or ten), who are practically the only pupils the Association has, dabble a little in acids and gases to help the lecturers in illustrating their lecturers; but that can scarcely be called practical teaching in the sense in which the Association originally used the phrase.

The next requirement is a supply of typical and most frequently used instruments. A sub-committee was originally appointed to prepare a list of such instruments, but it was never consulted; and the only information the committee of management got of instruments purchased was when drafts had to be met. Altogether about thirty thousand rupees have been written off on account of instruments; but I have failed, after repeated attempts during the last two years, to get for record in the office, an inventory of the instruments purchased and their detailed prices. The reply I always got in committee was that the lecturers had their onerous professional duties to attend to, and had no time to prepare an inventory. From what I have seen, I am of opinion that

the selection has not been made with that care, discretion, and regard to the requirements of an educational institution and its resources, which I had a right to expect from the parties concerned. The principal instruments in the laboratory of the Association are the most costly, the most showy, and best adapted for public exhibitions; but as a collection (writing without a list before me) they are neither typical nor serially arranged for a practical course of tuition. There are several instruments of some kinds (for instance, five electrical machines and three air-pumps, when one of each kind would have sufficed), while some branches of physical science are entirely unrepresented. A year ago I wanted to see a complete set of lenses, but the assistant in charge had them not to show. Had the sub-committee been consulted, and a list been prepared before making any purchase, I feel certain that Rs 30,000 would have given the institution a pretty complete set of instruments for all ordinary requirements.

On two occasions I asked the committee to let me have a sight of the questions and the answers on which resolutions were come to grant scholarships; but they were not forthcoming; I could not even ascertain how many students had been examined, and how many had been plucked. There were not even detailed reports to come to an intelligent resolution. The Secretary reported so-and-so should have the scholarships and the prizes, and the committee acted upon the recommendation.

The Government of Bengal originally granted the Association the use of the house at Bow Bazaar without any condition. Subsequently the only material condition proposed was that the educational work of the Association should be open to the inspection of Government officers. It was soon, however, discovered that such inspection would not be beneficial to the Association, and the house, therefore, was purchased at a cost of Rs. 30,000. Under a recent resolution, a further sum of Rs. 15,000 has been voted for a lecture hall fit to accommodate 500 persons. Had these two sums been retained in hand, their interest, along with that of the sum which the Association now has, would have sufficed to secure the services of three paid teachers, whose lectures would have placed the Association in such a position as to enable it to redeem its promises to a great extent, and remove all apprehension of the Government taking back the house from it. Looking to the scale of pay which obtains in Government colleges, the interest on about a lakh of rupees might at first sight appear insufficient for three teachers; but if it be borne in mind that at Cambridge 15 Sandlerean lecturers receive £45 each, that the lecturer of Natural Sciences in Emmanuel College received £67.10, that Sir Thomas Adams, Professor of Arabic, gets £72, the Lucasion Profession of Mathematics £137, the Professor of Moral Philosophy £195, and the Parliamentary grant for the Professor of Chemistry is £96, and that with the exception of some rich endowments, the average of stipends, apart from fees, is about £125 both at Oxford and Cambridge, I see no reason why indigenous lectures in Bengal should cost more. We cannot provide at present more than one lecture a week from each teacher, and for that I hold a hundred rupees ample. There are

teachers in Government schools and colleges in Bengal, who devote an hour or more daily to private tuition for a smaller remuneration, and Baboo Taraprosanna Roy, the gentleman who delivers lectures gratuitously at the Association, gets Rs. 100 from the Oriental Gas Company for his services as its analyst. Half the funded capital of the Association having now been spent and there being no immediate prospect of new subscriptions replacing it, the idea of paid lecturers cannot now be realized, and the Association must be satisfied with rich instruments and a big house with none to teach there except volunteers.

The anxiety recently evinced about a theatre for 500 can be explained only on the supposition that as in the case of the instruments, so in that of the house - show and ostentation have been preferred to honest, diligent work. The prospect of getting 500 students in Calcutta to attend to tuitional lectures on abstruse scientific subjects is very remote; and if the Association had them (it has a very small number now), it could teach them in a single class, Mr. Tawney, the other day, deposed before the Educational Commission that the power of human lungs for satisfactory teaching by lectures was limited to 50, and could not exceed a hundred or at the outside 150,. If there be any truth in this opinion, – and I believe it to be perfectly correct, – the plan of the Association to teach 500 at each lecture cannot be expected to result in much good. Lectures may be made interesting to an audience of 2,000 or more persons, but such lectures are not tuitional.

There are other serious defects in the management of the Association; but this letter has already become long, and I shall not take up your Honor's time by recounting them. The defects have all arisen from the circumstances of the committee not having the means of employing paid teachers, and being obliged to submit, without any discretion, to the wishes of the volunteer lecturers to keep up appearances; and the state of things cannot be mended at present. As far as I am personally concerned, I find that action as Chairman of the Committee I am called upon to announce to the public that to be progressing satisfactorily, which, in my humble opinion, is not doing what it professes to do, and to make myself morally responsible for the due appropriation of public subscriptions; and these I cannot conscientiously do. I feel therefore that the only courses left me is to sever my connection with the Committee of the Association.

Endnotes

[1]We have spelt Bose's name the way he did it himself. Most names have been spelt variously in published literature. In the colonial period it was customary for natives to spell their names in an anglicized fashion. There has been a general tendency to respell the names as if to backdate the national consciousness. Advisedly we have generally spelt the name as in autograph.

[2]At times the two parts of his personal name are combined into one and the surname spelt as Sarkar.

[3]The arrangement continued till 1912 when the Lieutenant-Governor ceased to be the ex-officio president. Then onwards the members chose a president from among themselves IACS (1948: 24).

[4]Biswas 2000: 330.

[5]Lee Warner 1900: vii.

[6]Kochhar 1992,1993.

[7]Phillimore 1945 I: 2.

[8]Phillimore 1958 IV: 461-462.

[9]Sanyal 1894: 25-26. For Sherwill's role in the "Santal insurrection" of 1855-1856 see Rycroft (2006).

[10]Mittra 1878: 31.

[11]Chattopadhyay 1978: 265, reproducing reports and comments published in the Bengal Spectator, 1843, May 17, Sep. I and Sep. 16.

[12]Shridharani 1953: 21.

[13]Shridharani 1953: 150.

[14]Cursetjee 1840: iii. Interestingly here we have Cursetjee referring to his fellow countrymen as natves.

[15]Cursetjee 1840: iii.

[16]Kochhar 1993.

[17]Kochhar 2008b.

[18]Natesan 1929: 250.

[19]Natesan 1929: 261.

[20]Andrews 1939 : 36-37.

[21]See Minault 2003 and reference therein.

[22]*Madras Mail 7* February 1880.

[23]Bagal 1933a, b.

[24]Phillimore 1958 IV: 402.

[25]Hampton 1947: 15.

[26]Ingleby 2000: 1.

[27]Mahmood 1895: 3.

[28]Mittra 1878: 127.

[29]Banerjee 1994: 170.

[30]Mittra 1878: 44.

[31]Mitra 1878.

[32]The colonial interest in the education of the Bengal boys could be excessive at times. Lord Auckland (1784-1849), who was the Governor-General of India during 1835-1841 and died unmarried, himself acted as the examiner for the 1839-40 examination at Hindu College (Cal.U. 1957: 27). He and his friends "used every now and then to visit the Barrackpore School", which Auckland himself had set up. A student, Bhola Nath Bose (1825-82), "soon attracted His Lordship's notice by his intelligence and progress in studies In the year 1840 His Lordship transferred him to the Calcutta Medical College with a stipend of Rs.10 a month, which he paid form his own private purse". In 1845, after five years of study at the Medical College Bhola Nath was sent to England as a Tagore scholar where he spent three years. On the eve of his return to India, Auckland, already in England since 1842 and as the First Lord of Admiralty, sent him a bank draft so that Dr. Bose could take with him "some token of remembrance". The money sent by Auckland must have been substantial because Bhola Nath decided to buy a gold watch with it. Auckland unsuccessfully tried to "obtain for Dr. Bose admission into the Covenanted Medical Service of India". Soon after his return to India in 1848 Dr Bose was "appointed Surgeon and Superintendent of Sukea's Lane Dispensary and Hospital in Calcutta, an institution which in fact was established "solely to employ him in town" (Sanyal 1894: 22-24). The acerbic journalist Sambhu Chandra Mookerjee referred to him and others as "the poor, pet native boys" of Lord Auckland (Bengal Past and Present, 1914, 9: 125-146, p.141).

[33]Sharp 1920 : 190.

[34]Minault 1999 :132.

[35]Mehta 1868 : 103.

[36]Trevelyan 1838: 198-200. Mahmood 1895: 236 does not give precise pagination.

[37]Based on data in Mahmood 1895: 47.

[38]Giving evidence before the Royal Commission on the Public Services in India in 1913, Jagadis Bose stated (para 83,669) that "At the Presidency College the facilities for scientific work were now greater than in many institutions in England";

see Bhattacharyya 1997 IV: 32.

[39]Hasan 1992: 68.

[40]Kochhar 2008a.

[41]Dharampal 1971.

[42]Jones 1788: 349.

[43]Said 1978.

[44]Kochhar 2008a.

[45]Kochhar 2008a.

[46]It is noteworthy that while the social leadership among the Hindus was in the hands of those who had been unprivileged a generation or two previously, the Muslim community leaders were all pedigreed. The establishment of "the first Muslim literary-cum-political organization in Bengal", namely the Mahomedan Literary Society of Calcutta in 1863 was the handiwork of the descendents of the "sons of Tipu Sultan and the Oudh princes" along with "another Muslim of foreign origin Abd al-Latif" (All 1985: 771). The last-named was Nawab Abdul Latif Khan Bahadur (1828-1892), whose ancestors had migrated from Mecca. "Although for over thirty five years he occupied no higher position than that of a Deputy Magistrate" (Bradley-Birt 1910: 111), he was "often consulted by Government as the most progressive and enlightened among the Muhammadans of Bengal" (Buckland 1926: 2) It is significant that throughout India the prominent Muslims held far junior positions in the government hierarchy than Hindus.

[47]Ghose 1935.

[48]Sircar 1904.

[49]Natesan 1927.

[50]See Biswas 2000. These hand-written diaries are preserved in the Science Association Archives, They deserve to be published on-line in their entirety, suitably edited and annotated.

[51]Interestingly Sircar's son thought it fit to remind the readers of his father's obituary that the family was "certainly not from what are called the lower orders of Society" (Amrita Lai Sircar 1904 reprinted in Biswas 2003: 513).

[52]According to Natesan (1929: 4) however Sircar and family came to live in Calcutta only after his father's death.

[53]Poor but meritorious students under Hare's care were derisively called *Boreah* by their well-heeled classmates (Mittra 1878: 149). (One wonders whether the term came from *borah*, the low-cost jute bag in which these boys probably carried their books, lunch box, *etc.*). Another celebrated *Boreah* was Ramtanu Lahiri (1813-1898), a universally respected educationist and the conscience-keeper of his time. Hare had first declined Ramtanu's request for admission. Ramtanu's well-wisher "evidently knowing the kindness of Mr. Hare's nature, instructed Ramtanu to remain in waiting outside the great man's gate and to repeat his request, running beside his palanquin every time he entered or left his house. For two months Ramtanu remained a supplicant, poor and in straitened circumstances, but hopeful and persistent. It was truly a triumph of importunity, for Mr. Hare at last convinced of Ramtanu's sincere desire for an English education appointed him to a free scholarship in the Hare school..." (Bradley-Birt 1910: 66-67).

[54]Natesan 1929: 11.

[55]Bose 1925: 382 quoting Dr. Banwari Lai Chaudhury.

[56]Cal.U.1957: 101.

[57]Ghose 1935: 6.

[58]Rajendra Dutt let his 23 year old married son die of enteric fever than save him by giving

quinine as urged by the boy's in-laws, physicians and others on the ground that "what would the people of the patients who had already died at his hands without taking quinine, say?" (Ghose 1935: 60-61).

[59]Ghose 1935: 9.

[60]Palit 1998: 285.

[61]Ghose 1935: 365.

[62]Biswas 2000: 28.

[63]Ghose 1935: 333.

[64]Buckland 1906: 391; Ghose 1935: 245.

[65]Ghose 1935: 247.

[66]Sircar's social connectivity can be gauged from the fact that one January 1882 morning he called on the Calcutta University Vice-Chancellor with the request that Sircar's son Amrita Lal be given some grace marks to enable him to pass the intermediate examination. It is a separate matter that Sircar's mission was against his own better judgment and that the Vice-Chancellor refused to oblige (Biswas 2000: 81).

[67]Cal.U. 1957:461.

[68]Ghose 1935: 172-208.

[69]Curiously, Ghose (1935) does not refer to this meeting at all. His narration in fact begins with the Senate meeting of 13 July 1878, see below.

[70]Ghose 1935: 176-177.

[71]Ghose 1935: 186.

[72]He had an honorary doctorate in law from Calcutta University bestowed in 1876. Strictly speaking it should not have been used as a prefix. But he was commonly addressed as Doctor.

[73]Ghose 1935: 208.

[74]To quote Ghose (1935: 208) : "being frustrated and disappointed at their long cherished object of removing Dr. Sircar from their Faculty, they began to hatch plots secretly against Dr. Sircar. This fact was brought to Dr. Sircar's notice and he, in utter disgust, tendered his resignation as a member of the Faculty of Medicine." If Ghose had consulted the University records he would have discovered there was no secret plotting.

[75]Sinha 2007: xxxx.

[76]Biswas (2000: 3) wrongly states that Sircar "was elected a Fellow of the Calcutta University first in the Faculty of Arts in 1870 and then in the Faculty of Medicine in 1878". Sircar was not elected but nominated to the Arts Faculty. Biswas makes no reference to the conflict between the Medical Faculty and the Senate or to Sircar's resignation from the Medical Faculty. The official publication *Hundred Years of the University of Calcutta* gives some details but tends to obfuscate rather than communicate. It states rather delicately that "the Syndicate

recommended the inclusion of the name of Mahendra Lal Sarkar in the list of members of the Faculty of Medicine" (Cal.U.1957: 101-102). It closes the account with a dense sentence: "On an amendment moved by Rajendralal Mitra it was resolved by the Senate that after consideration of the letter addressed by Mahendra Lal to the Registrar and of the proceedings of the Faculty of Medicine, both the letter and the proceedings be recorded" (Cal.U. 1957: 102). It is difficult to conclude from this that Sircar was actually transferred to the Medical Faculty against the latter's wishes. No mention is made of the fact that eventually Sircar opted out.

[77]The *Calcutta Journal* article has been reprinted in Biswas 2003: 40-44. There are very minor differences between the journal article and the pamphlet.

[78]Trautman 1997: 176

[79]quoted in Kochhar 2000: 10

[80]Kochhar 2000: 228, note 29

[81]Western scientific methodology could reside harmoniously with "tradition" in the Sircar household. There is an interesting entry dated 11 December 1890 in the diary of Sircar's son Dr. Amrita Lal Sircar, himself an LMS "Father's *alwan* [a kind of shawl] and a pair of golden spectacles have been stolen. Nothing could be made out as to the party who did the action, and therefore Kamiruddin of Danga Digha has been brought down to find out the man by *Nalachalaa* [some sort of divination to catch the thief]. He will do it tomorrow." *Nalachalaa* was indeed done on 12 December 1890 (Friday), "but the final decision could not be arrived at. So the man will again come on Monday and then he says he will come to a definite decision". We learn about the incident from Biswas (2000: 151), who however does not tell us how the story ended. He even very self-consciously writes the word *N* in Bengali script so that all but the most persistent readers will gloss over it.

[82]Biswas 2003: 79-80.

[83]Natesan 1929: 145.

[84]Biswas 2003: 84-90.

[85]Biswas 2003: 216.

[86]Biswas 2003: 132.

[87]Sircar 1880: xii.

[88]Lipner 2005: 229.

[89]Morrell and Thackray 1981: 256.

[90]See list in Biswas 2003: 213-217.

[91]What was Sircar's link to Patiala? Did he render unrecorded medical service to the maharaja? Or, did a high official in Patiala have a Bengal connection like in Kashmir? Interestingly, in 1884, Sircar offered to go to Kashmir to treat the Maharaja for his hereditary diabetes provided the Maharaja made a contribution to the Science Association. The matter however remained undecided (Biswas 2000: 80).

[92]Biswas 2000: 17.

[93]Namboodiry 1995: 76.

[94]Nature 1908: 33, reprinted in Biswas 2003: 567.

[95]Another college which took to science teaching was the Presidency College, which acquired a chemistry professor [Sir] Alexander Pedlar, in 1874, under whom the college built a world-class chemistry laboratory.

[96]Jagadis Bose was Lafont's student.

[97]Nature 1908: 33, reprinted in Biswas 2003: 567.

[98]Amrita Lai Sircar 1904: [518].

[99]Lafont became so close to the Sircar family that in 1884 Sircar's son Amrita Lai felt bold enough to request Lafont to give a testimonial to the brother of Amrita Lai's friend even though the candidate was not known at all to Lafont (Biswas 2000: 137).

[100]Cal.U. 1857: 463.

[101]Cal.U. 1957: 441. Recall that Sircar was given a doctorate in law, not science.

[102]Chinnici 1995/96: 106, n.21.

[103]Namboodiry 1995: 72-73.

[104]Chinnici 1995/96: 94.

[105]The Xaverian, 2:308-310, reprinted in Biswas 2003:204.

[106]Chinnici 1995/1996: 106, n.24.

[107]Chinnici 1995/1996:95.

[108]Pigatto and Zanini 2001.

[109]Biswas (1969: 76) is wrong in saying that "Father Lafont's astronomical work was pioneering indeed as the Govt. of India decided, almost simultaneously, to erect an observatory at Kodaikanal. The latter came up much later and for entirely different reasons; see Kochhar 1991. In my capacity as the Executive Secretary of the Organizing Committee of the International Astronomical Union's Commission on History of Astronomy, I have recently proposed that St Xavier's as well as Kodaikanal observatories be included in the list of world's astronomical heritage sites.

[110]Biswas 2000: 27.

[111]The native gentlemen saw themselves as distinct from ordinary natives. Sircar noted with disapproval in his private diary that the Lieutenant-Governor in 1883 spoke of "us" as natives [italized by Sircar!] and not native gentlemen; Biswas 2000: 88. In 1894 at J C Bose's public lecture, "Mr. Walters, Secretary of the Higher Training Society insulted a Bengali gentleman who is a professor". Native gentlemen were easily persuaded by Gooroodas Banerjee to stomach the insult. Amritalal Sircar's diary entry; Biswas 2000: 160.

[112]Data are from Sircar; Biswas 2003: 213-217.

[113]The 1929 biographical sketch of Sircar says rather crudely: "He was well aware that official support was the only key to un-loose the purse-strings of his wealthy countrymen. The greatness of the cause, the nobility of the enterprise and the immenseness of public utility that would result therefrom were no doubt sufficient inducements to the educated and enlightened middle class. But the merchant princes and landed aristocrats, hungry for title and fame, would slavishly follow the foot-prints of the official head of the province" (Natesan 1929. 12). This is not quite true because as we have seen the Association was kept alive by donations from rich people.

[114]Biswas 2000: 402.

[115]Biswas 2003: 108-109.

[116]Biswas 2003: 112.

[117]Kennedy 1910: 290.

[118]Bom. Edu. 1958: 462.

[119]Mukherjee 1975: 294.

[120]Mukherjee 1975: 294-296.

[121]Mukherjee 1975: 297.

[122]Tayler 1871: 26.

[123]British Library IOL MSS EUR C144/17.

[124]He did try unsuccessfully in 1877 to set up a University for Bengal distinct from the "all India" Calcutta University (Chattopadhyay 2007: 23). Calcutta University was transferred from the Government of India to the Bengal Government in 1921; Chattopadhyay 2007: 44.

[125]Bom. Edu. 1958: 329.

[126]Temple 1896 I: 287.

[127]Dongerkery 1957: 26.

[128]Allahabad University followed in 1897, Punjab University in 1902, and the Calcutta in 1907. It is a separate matter that the course did not become very popular. In 1901-02 only 13 candidates took it : 6 in Bombay, 3 in Allahabad, 2 each in Calcutta and Punjab, and none in Madras. The "institution of the BSc degree in 1907 gave a fresh impetus to the study of Science. A candidate for a Science degree was now relieved of the heavy handicap of taking up English literature as one of his subjects, and he was in a position to devote more time and attention to Science. He had on the other hand to go through a systematic training on the practical side." (Ray 1918:29).

[129]Dongerkery 1957: 273.

[130]Chandra 1971; Furedy 1979.

[131]Furedy 1979.

[132]Papers such as *Indian Public Opinion* and *Punjab Times* "preferred practical and professional orientation for the new science movement" (Biswas 2000:43).

[133]Biswas 2003:125.

[134]Biswas 2003: 134-144.

[135]Biswas 2003: 144.

[136]Biswas 2003:152.

[137]Kochhar 2007.

[138]Biswas 2003: 149.

[139]Ghosh 2002: 56.

[140]General Report on Public Instruction in the Lower Provinces of the Bengal Presidency, for 1866-67. Appendix A, pp. 576-580, 1867.

[141]Biswas 2003: 162-163.

[142]Biswas 1969: 60-61; Biswas 2001:89.

[143]Sircar 1876: [S40-41].

[144]Ray 1932: 94-95.

[145]Sharp 1920: 86.

[146]Sharp 1920: 88.

[147]Ray 1918: 175-176.

[148]Pres. Coll.1956: 53.

[149]Cal.U. 1957: 96.

[150]Pres. Coll. 1956: 11.

[151]Ray 1918: 21.

[152]Pres. Coll. 1956: 16.

[153]Pres. Coll. 1956: 16.

[154]Dr Chuni Lal Bose addressing Science Association on 29 September 1920: Sen 1988: 11).

[155]In the following when factual statements are made giving the year the source is the relevant annual report.

[156]Biswas 2000: 96, n.7.

[157]Biswas 2000: 109.

[158]Sinha (1966) is an authentic source of information on Asutosh which has often been reproduced with or without acknowledgement.

[159]Sinha 1966: 7. Pres. Col. 100 does not list physics as subject for MA but natural and physical science. It does not mention Asutosh as passing out in 1886 (Pres. Coll. 100: 90). Presumably he wrote the examination privately.

[160]Sinha 1966: 13.

[161]Sinha 1966: 179-180.

[162]Sinha 1966: 176.

[163]Sinha 1966: 11.

[164]Biswas 2000: 65.

[165]IACS (1976: 21) makes a rather strange claim : "From 1891 or so the attendance started falling due largely to the organization of science departments in colleges of Calcutta. Instead of feeling discouraged, Dr. Sircar regarded it was a good sign, for now, he thought, it would be possible to concentrate more and more on discourses of a graver nature giving the results of recent discoveries". It is not clear on what basis Sircar's inner thoughts have been articulated.

[166]Ray 1932: 77-78.

[167]Ray 1932: 149.

[168]The exact sequence and chronology of introduction of science teaching in individual colleges and the impact thereof on the Science Association need to be studied in detail.

[169]The Science Association decided in 1907 to seek disaffiliation from Calcutta University "as the Association had now some funds and abilities for pursuits of original research, and as the task of science-teaching could now be left to the competent authorities of the private colleges" (Biswas 2001: 129). Thus sadly the Science Association's rise as a research institute meant its demise as a college laboratory.

[170]Biswas 2000: 308.

[171]Sircar's diary entry dated 27 November 1899; Biswas 20000: 345.

[172]Bagal 1955: 7.

[173]IACS 1976: 24.

[174]Biswas2003: 303.

[175]Biswas2003: 3006.

[176]Biswas2003: 237.

[177]Biswas 2000: 306-307.

[178]We learn from the annual report for 1884 that following the Viceroy's lead Maharaja of Darbhanga subscribed Rs. 10000; Nizam of Hyderabad Rs. 3000; and his deputy Nawab Salar Jung Rs. 1000. A general grant of Rs. 1000 from the first prince of Indore was unilaterally assigned to the Ripon fund. In all a total sum of Rs. 17050 was said to be subscribed. The annual report further informs that "Of this amount the sum of Rs. 2,050 has already been realised" (Biswas 2003: 313). Yet the annual report for 1888 states that a sum of over Rs. 13,000 was subscribed in 1884; while Rs. 5000 were added in 1885 and Rs. 1500 in 1886 (Biswas 2003: 337). As per later annual reports the fund showed only Rs. 2210 in 1892, while 1932 end it stood at Rs. 17000 (Rajinder Singh, personal communication). Quite obviously funds were transferred from one head to another. It is thus not possible to trace the growth of the fund.

[179]Biswas 2000: 306-307.

[180]Biswas 2000: 403.

[181]Biswas 2000: 46.

[182]Sircar 1880: i.

[183]Ghose 1935: 253.

[184]Biswas 2000: 46 does not cite any source for this assertion.

[185]Banwari Lal Chaudhury, quoted in Biswas 2000: 165.

[186]In 1880 the Association received from Kumar Kanti Chandra Singh Bahadur gift of a seven-inch diameter equatorial telescope made by Merz in Germany with mounting by Browning. To keep it company the Association bought a "number of appliances to demonstrate astronomical phenomena". It was worth Rs. 6000 (Biswas 2000: 92). But "Astronomy had a very brief existence at the Association" (IACS 1976: 18).The telescope lens was however later used by Raman in his Nobel prize winning experiment (Biswas 2001: 72).

[187]Biswas 2001: 71.

[188]Mitra 1882; reprinted as Appendix III.

[189]On 8 June 1882 Sircar received from Babu Kally Kissen Tagore "Rs. 2,500 on my account for medical attendance and Rs. 1,500 in part payment of his donation in aid of the Building Fund".

[190]Biswas 2000: 81.

[191]Biswas 2000: 53.

[192]In 1948 it was decided to shift to a quieter and larger campus. The present campus, in the Jadavpur suburb was inaugurated in 1953. The original property was sold off. The old buildings have since been demolished and the historic site now houses government-run Goenka College of Commerce (IACS 1948: 30).

[193]Biswas 2000: 82.

[194]Biswas (2000: 129) asserts: "Mahendra Lai had successfully treated the ailments of Maharaja of Vizianagaram and preferred to have a princely donation from the laboratory from him instead of his receiving private fees. The Maharaja gladly obliged his doctor and science pioneer". This account for which no reference is cited is at variance with that of Ghose (1935: 56) who describes the Maharaja as Rajendra Dutt's patient. Curiously in the annual report for 1892 Sircar called the Vizinagaram offer "unsolicited" (Biswas 2003: 384) which it certainly was not.

[195]Ghose 1935: 56.

[196]Sen 1988: 40.

[197]IACS 1976: 30.

[198]IACS 1976: 68.

[199]Biswas 2003: 251.

[200]Attention to the resignation letter has been drawn by Biswas (200: 96-97, n.8) who however quotes very selectively from it leaving out the more serious allegations. Though Biswas 2003 reprints various press reports pertaining to the Science Association Mitra's resignation letter is not reproduced.

[201]Biswas 2000: 84.

[202]Biswas 2000: 49.

[203]Biswas 2003: 131.

[204]IACS 1976:25.

[205]Biswas 1969: 64.

[206]Biswas 1969: 64-65.

[207]His doctorate was spurious. It arose because he was a corresponding member of the American Institute of Homeopathy which addressed him as Doctor. "What vanity and dishonesty!" was Mahendra Lal Sircar's private response; Biswas 2000: 82.

[208]Skrine 1894: 323.

[209]Ghose 1935: 253.

[210]Biswas 201: 272.

[211]The sporadic scientific work carried out by Dr. Sarasi Lal Sarkar and under Dr. Chunilal Bose in the Association labs did not amount to much; Biswas 2001: 120.

[212]IACS 1976: 25.

[213]Sircar's diary entry dated 9 February 1899; Biswas 2000: 330.

[214]Rai Dr. Chunilal Bahadur credited Bose with "proving that the world's advances in Science would be incomplete without India's active cooperation (Bose 1925: 413).

[215]When exactly was the London degree obtained? Geddes 920: 31 does not give any date for either of the degrees. Most authors agree on 1884 for the Cambridge one. For the London degree Natesan (1921: 5) implies 1885, Dasgupta (1999: 35) would assign it to 1883 which however is unlikely.

[216]Garratt 1994: 65.

[217]Bose's nephew Debendra Mohan Bose (1885-1975) cited without reference in Bhattacharyya and Engineer 1994 I: viii.

[218]Ray 1932 1: 153.

[219]"Dr. Kunz of Illinois University" quoted in Geddes 1920: 59.

[220]An interview recorded with Bose at the Liverpool meeting of the British Association "after he had delivered his paper". It was published in the December 1896 issue of a magazine called *India*. The interviewer is identified merely as C.S.B.; Bhattacharyya and Engineer 1994 IV: 312-313.

[221]Maitra 1959: 263-264.

[222]The Bangla original is : *Je Iswar tomar dwara Bharater lajja nibaran kariachhen aami tahar charane aamaar hridayke abonato karia rakhiachhi. I thank Bhupati Chakrabarti for the Bangla original and his English translation.* Maitra 1959: 270) tranaslated the line as "Through you God has saved India from ignominy, and my heart bows down at His feet". I thank Krishna Dutta for the exact reference.

[223]Translated by Manmohan Ghosh; Visvabharati Quarterly, 1959, 24 (4): 258-259. husband

[224](Dasgupta 1999: 92).

[225]Gupta 1970: 125-128.

[226]Gupta 1970: 38.

[227]For example Garratt 1994, though published by the Institution of Electrical Engineers, does not mention Bose.

[228]Kochhar 1998.

[229]At the twelfth Indian National Congress session in 1896 Anand Mohan Bose referred to the western recognition won by Bose and Ray and also drew attention to the fact that in 1896 an Indian candidate Atul Kumar Chatterjee (1874-1955) had come first in the ICS examination beating many European competitors. Anand Mohan declared that while "India has not forgotten the traditions of her glorious past", "the Indian mind has awakened to the consciousness of the great destiny before it", and "has taken the first practical steps towards obtaining its recognition from the generous scholars of the West" (Ray 1932: 156).

[230]Ray 100: 51.

[231]Ray 1932: 84-85.

[232]Ray 1932: 98-99.

[233]Even Ray's autobiography does not give the exact date. The unit is known to be in operation before the 1893 summer vacation (Ray 1932: 102). According to Mukherjee (2004: 10), "The journey of BCPW began in 1892".

[234]Ray 100: 299.

[235]Ray 100: 74.

[236]Ray 1932: 105.

[237]Lala 1992: 38.

[238]Subbarayappa 1992: 21.

[239]Ray 1918: 9.

[240]Sircar addressing the 22nd annual meeting of the Science Association, 27 April 1899; Biswas 2003: 459.

[241]Lala 1992: 42.

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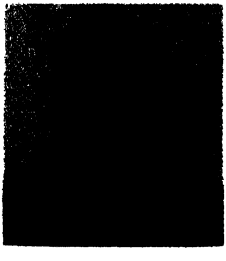
About the Author



Professor Rajesh Kochhar obtained his MSc Honours School in Physics in 1967 and PhD in 1973, both from Panjab University, Chandigarh, where he began his career as a lecturer. He was a Professor at Indian Institute of Astrophysics, Bangalore, in 1999, when he moved over to New Delhi to take charge as Director NISTADS: National Institute of Science, Technology and Development Studies, New Delhi (CSIR). Currently, he is Professor of Pharmaceutical Heritage in NIPER: National Institute of Pharmaceutical Education and Research (Government of India), Mohali.

Professor Kochhar has published original research in a number of fields: history and sociology of science & technology; science and education policy; ancient Indian history; and modern astronomy and astrophysics. His papers and articles have been well-cited by researchers; policy and opinion makers; as also by the on-line Wikipedia. His views have been sought and published by magazines like Science and Nature as also by BBC Radio.

commemorative lectures including the 67th J C Bose Memorial Lecture, the first lecturer in the series being Rabindranath Tagore. Professor Kochhar has been a Jawaharlal Fellow, a Fulbright Visiting Lecturer, a Visiting Scholar at University of Cambridge Department of history and Philosophy of Science; and honorary professor of History of Science and Technology at National Institute of Advanced Studies, Bangalore. He is the recipient of National Academy of Sciences India's Professor R C Gupta Endowment History of Science Lecture Award for the year 2006. He was the Chairman of the University Grants Commission team that assesses the tenth five year plan requirements of Maharshi Dayanand University, Rohtak. He is the national representative for teaching of astronomy, at International Astronomical Union. He is the Secretary of the organizing committee for International Astronomical Union Commission 41 on History of Astronomy.